October, 1946

THE FOUNDRY

wherever metals are cast . . .

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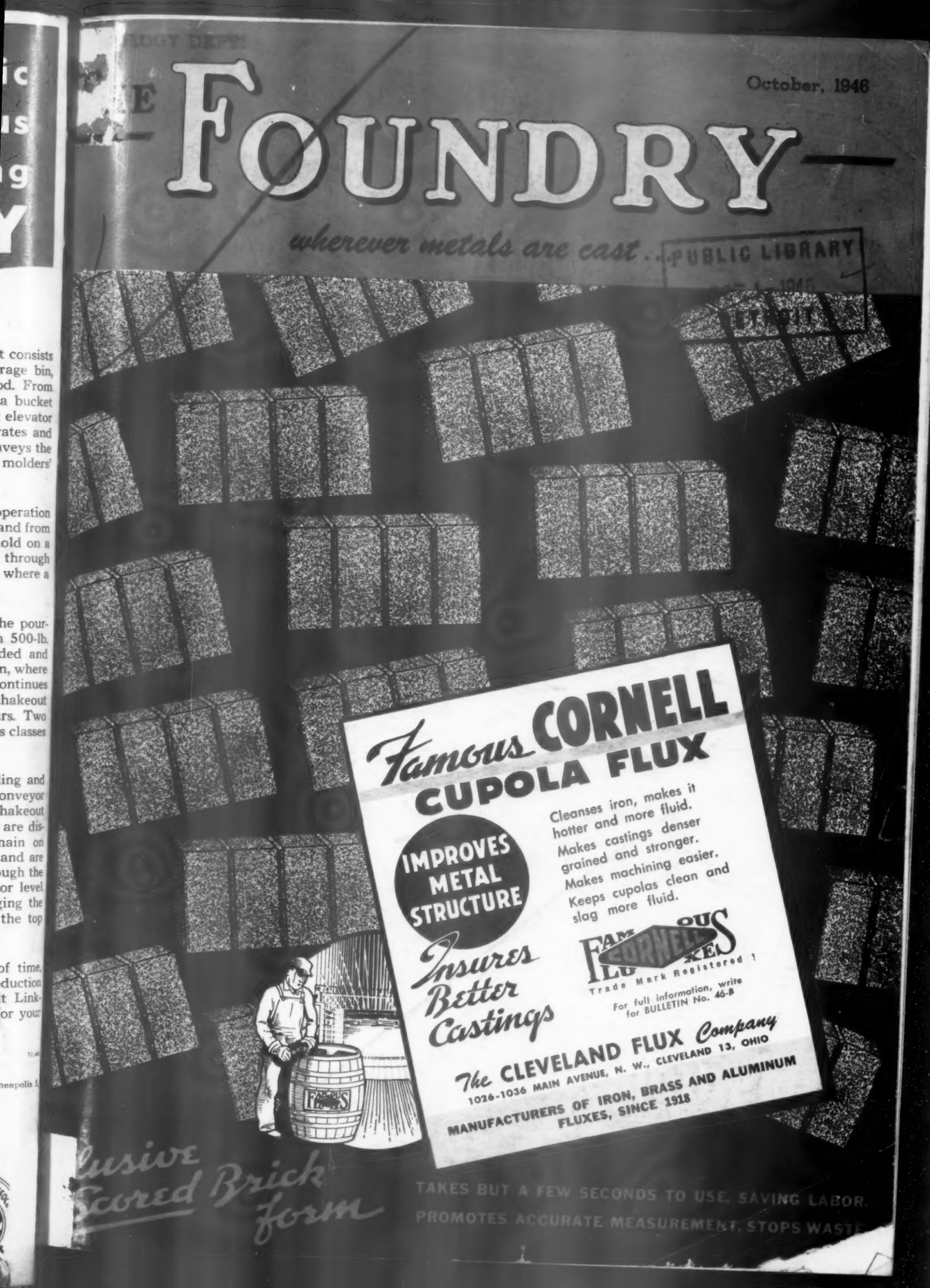
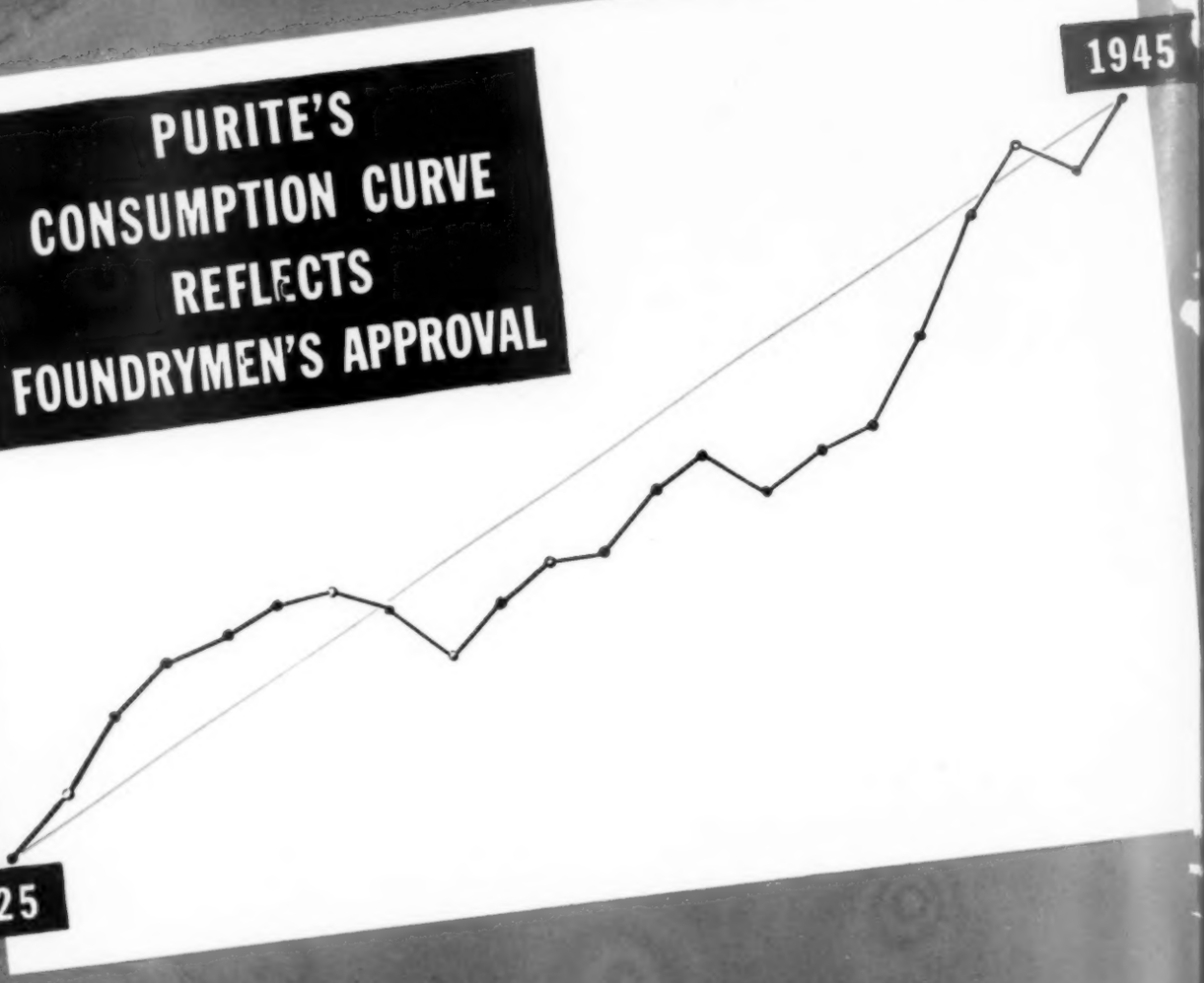

Famous CORNELL
CUPOLA FLUX
IMPROVES METAL STRUCTURE
Cleanses iron, makes it hotter and more fluid.
Makes castings denser grained and stronger.
Makes machining easier.
Keeps cupolas clean and slag more fluid.
Insures Better Castings
Trade Mark Registered
For full information, write for BULLETIN No. 46-B
The CLEVELAND FLUX Company
1026-1036 MAIN AVENUE, N. W., CLEVELAND 13, OHIO
MANUFACTURERS OF IRON, BRASS AND ALUMINUM FLUXES, SINCE 1918
Exclusive Scored Brick form
TAKES BUT A FEW SECONDS TO USE, SAVING LABOR.
PROMOTES ACCURATE MEASUREMENT, STOPS WASTE

PURITE'S CONSUMPTION CURVE REFLECTS FOUNDRYMEN'S APPROVAL



The steady climb of this consumption curve *proves* the value of Purite in refining cupola cast iron. The increasing demand for this scientific flux over a 20-year span is the best testimonial foundrymen can give to Purite.

Purite's remarkable action in desulphurizing and refining iron in the ladle or in the cupola hearth—its effect on combustion—and its action in smoothing out cupola melting operations are the reasons behind the ever-increasing use of Purite by progressive foundrymen everywhere.

Purite does *more* than remove sulphur; it purges molten metal of occluded gases, entrained oxide-silicates and other non-metallic impurities that ma cause pinholes, gas pockets and segregated defec Refining with Purite increases the strength . . . i proves grain structure and machinability . . . spee production of cleaner, sounder castings.

According to a recent survey, over 70% of t foundries in four principal casting centers in t North, South, East and Midwest are using Puri regularly. We feel you'll want to know why s many foundries consistently order Purite—so wri for free factual information that tells ho Purite helps them, and how it can help you these competitive days.

Mathieson
CHEMICALS

THE MATHIESON ALKALI WORKS (INC.)
60 EAST 42nd STREET, NEW YORK 17, N. Y.
In Canada: Railway & Power Engineering Corporation, Limited.

Purite (Fused Soda Ash) . Liquid Chlorine . Caustic Soda . Soda Ash . Bicarbonate of Soda . Ammonia, Anhydrous & Aqua . Sodium Chlorite Products . Chlorine Dioxide HTH Products . Synthetic Salt Cake . Dry Ice . Carbonic Gas . Sodium Methylate

99% PURE FUSED SODA ASH

PURITE

The Scientific Flux for Better Melting and Cleaner Iron

This chipping job is going FAST

The minute he presses the trigger you'll see action. Chips will fly and the warty insides of that casting will soon be cleaned up smooth.

That's because he's got Omega steel in his chipping chisel. Bethlehem Omega's a tough, shock-resisting steel that's specially made to resist heavy impact at normal working temperatures. Its Rockwell C ranges from 58 to 62—plenty hard for a good, keen cutting edge and a sturdy, non-peening shank.

We can best describe Omega as a "hard-knock" steel. You can't beat it for chipping work. Whether you make your own chisels and core breakers, or whether you buy them ready for use, we recommend specifying Bethlehem Omega.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

BETHLEHEM STEEL

OMEGA ... one of Bethlehem's BIG 8 Tool Steels

Control

MEANS TO GOVERN, OR TO REGULATE. A STAR PITCHER REGULATES HIS DELIVERY . . . AND GETS GOOD RESULTS. ANOTHER STAR PERFORMER,

FEDERAL GREEN BOND

regulates sand strength and gets excellent results every day in hundreds of foundries. FEDERAL GREEN BOND controls the strength of the sand to any desired limit. It may be mixed to produce an exceptionally firm sand, or a sand that collapses readily and runs freely. That's why foundrymen everywhere specify FEDERAL GREEN BOND as a matter of course.

BEST OF THE BENTONITES

THE FEDERAL FOUNDRY SUPPLY COMPANY

4600 East 71st Street • Cleveland 5, Ohio

Seacoal Plant CROWN HILL, W. VA. • CHICAGO • CHATTANOOGA, TENN. • DETROIT • MILWAUKEE • NEW YORK • ST. LOUIS • RICHMOND, VA. • Mines UPTON, WYO.

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THE FOUNDRY

for

OCTOBER 1946

VOLUME 74 NUMBER 9

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PRECISION CASTINGS

E. M. BENEDICT CO., INC.

89 Brandel Avenue

LANCASTER, N. Y.

LINOIL

"Ours is a new foundry, opened last June, but we are not new to the foundry business. Our decision was to make precision castings, quality castings that conform sharply to specifications. This called for a precision core oil, and experience indicated Linoil.

"Linoil is serving our needs perfectly. We are turning out excellent castings in good volume, using a drum of Linoil a day. Casting losses are exceedingly low, none so far due to oil. We have confidence in Linoil; and confidence in your core oil is a big factor in making the foundry business easy."

ELMORE M. BENEDICT
President

THE WERNER G.

(DIVISION OF ARCHER

2191 WEST 110 STREET WOODBINE

AND CORE OIL TO FIT

Your core room may be operated as a department separate from your foundry proper, but the success of your foundry depends to a large measure upon the quality of the cores. The top men in the foundry must have absolute confidence in the cores, must be able to simply take the quality and rightness of the cores for granted, and be able to devote 100% of their alertness and skill to other problems as they arise. An oil about which there is the slightest question in the foundry means jittery workmen and supervisors and is an expensive and unnecessary evil. Linoil gives every intelligent workman a feeling of security that reflects immediately in better work. The man who buys the oil should keep this angle in mind as well as the more obvious results of good oil as expressed in percentage of perfect castings and low per ton cost. For satisfaction and security in all departments, use LINOIL.

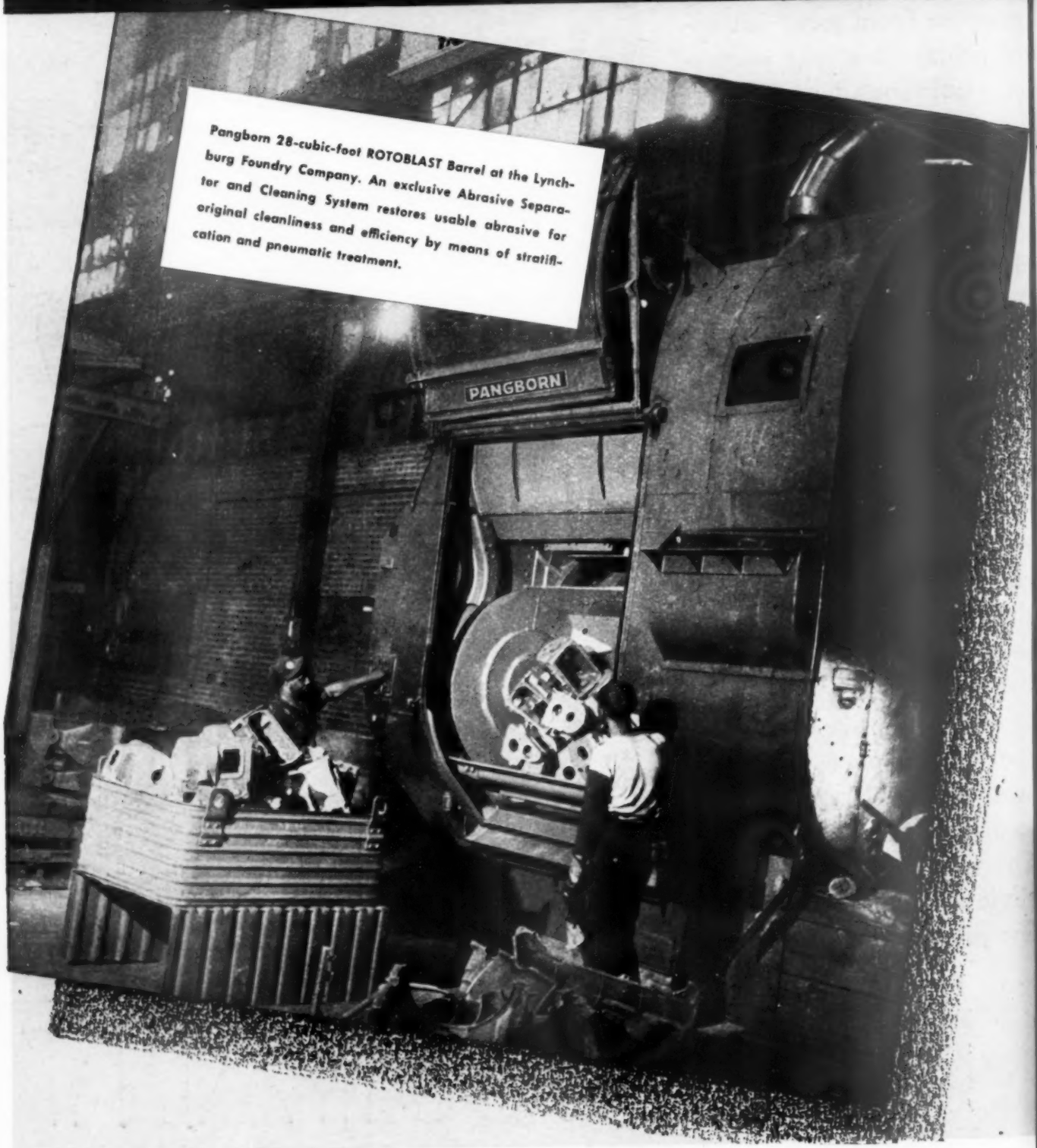
SMITH COMPANY

DANIELS - MIDLAND COMPANY)

690 CLEVELAND 2, OHIO

Pangborn

PANGBORN CORPORATION, HAGERSTOWN, MARYLAND



Pangborn 28-cubic-foot ROTOBLAST Barrel at the Lynchburg Foundry Company. An exclusive Abrasive Separator and Cleaning System restores usable abrasive for original cleanliness and efficiency by means of stratification and pneumatic treatment.

TOPS 200-TON-A-DAY MARK

So Lynchburg Foundry "Comes to Pangborn" for 3rd time

When Lynchburg Foundry Company installed a completely new mechanized molding system, they replaced their tumbling mills with Pangborn blast cleaning equipment to make sure that cleaning would keep pace with the high-production molding.

Results have even surpassed expectations. The Pangborn machines (two ROTOBLAST* Airless Barrels and one Pangborn Airblast Room) have achieved production rates as high as 200 tons a day — and *average* 160 tons a day. The quality of cleaning is so high that rejections have dropped and the amount of finishing time per piece is only a fraction of the time formerly required.

So — when still more capacity was needed, Lynchburg Foundry came to Pangborn. A third ROTOBLAST Barrel was recently delivered.

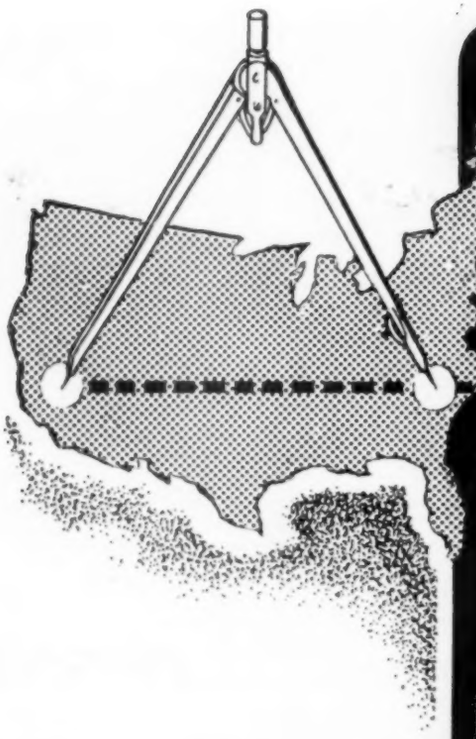
Complete information on the ROTOBLAST method of airless blast cleaning, which saves time, saves breakage, improves quality, facilitates inspection and finishing, is available from Pangborn Corporation, 1284 Pangborn Boulevard, Hagerstown, Maryland — *world's largest manufacturer of blast cleaning and dust control equipment.*

*Trademark of the Pangborn Corporation.

MORE SPEED . . . AND BETTER WORK. 8 minutes produced the difference in these two pictures. Note the quality of the finish on the parts. Pieces with intricate deep pockets are thoroughly cleaned by ROTOBLAST.

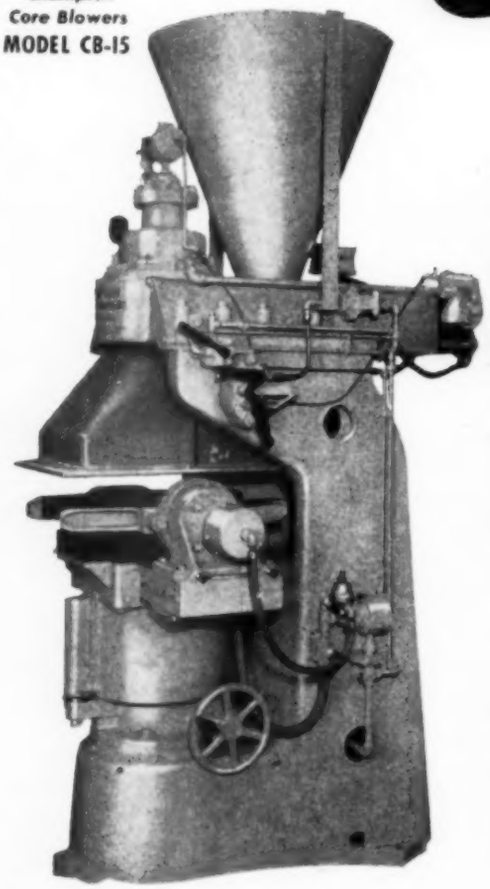
Rotoblast*

The airless centrifugal unit that propels metal abrasive without crushing, without waste

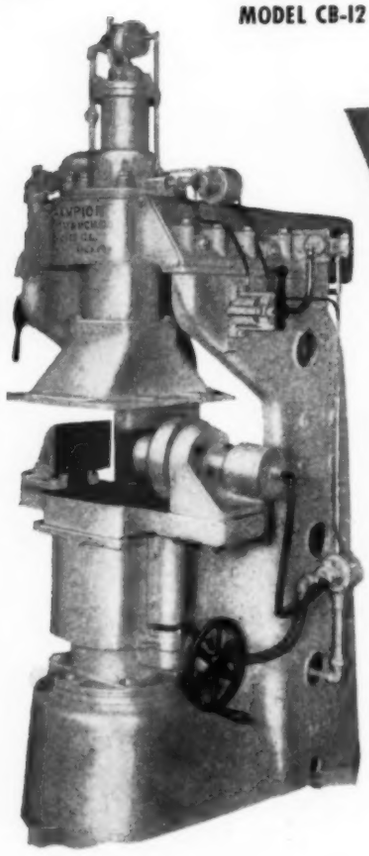


FOUNDRYMEN from Coast to Coast are thrilled by CHAMPION "Knowhow"

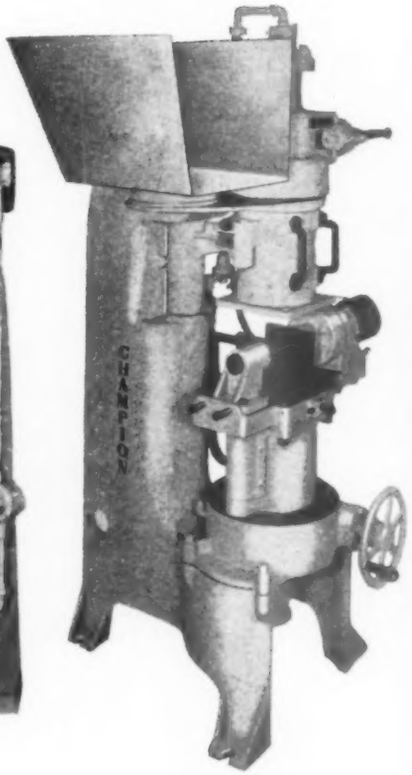
Champion
Core Blowers
MODEL CB-15



Champion
Core Blowers
MODEL CB-12



Champion
Core Blowers
MODEL CB-8

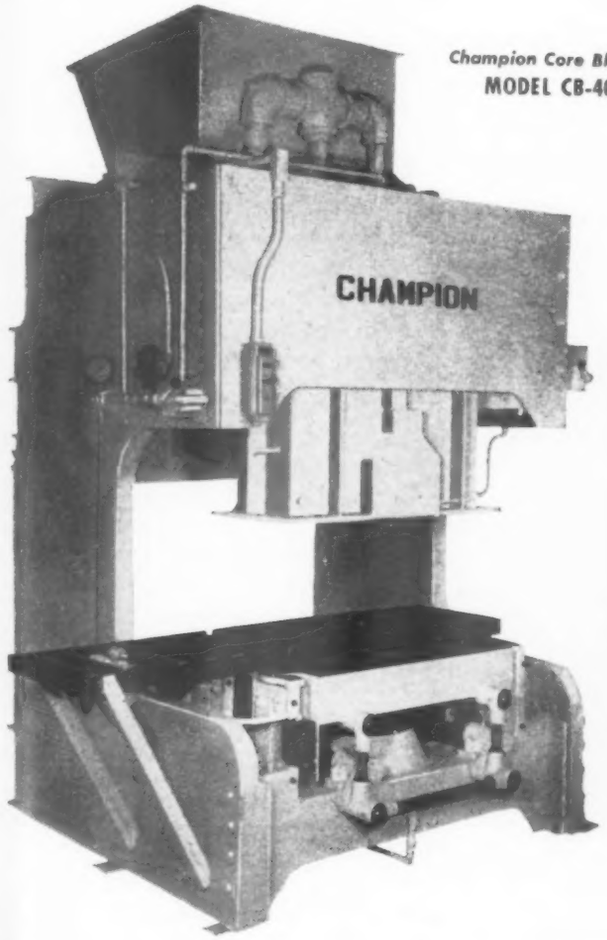


Performance under the stress and strain of today's demand for accelerated production of perfectly rammed cores is the test of a true Champion—a top-notch tool with the "know how" or "savvy" to remove all guesswork.

That is how a Champion Core Blower performs for the least experienced operator. Any man or woman—boy or girl can produce perfectly rammed cores on a Champion Core Blower by merely setting the box and pulling the lever. In a single second small or large cores are perfectly rammed. The working table is completely accessible with no obstructions, so that cores are produced faster, more economically and more accurately without need for highly trained labor.

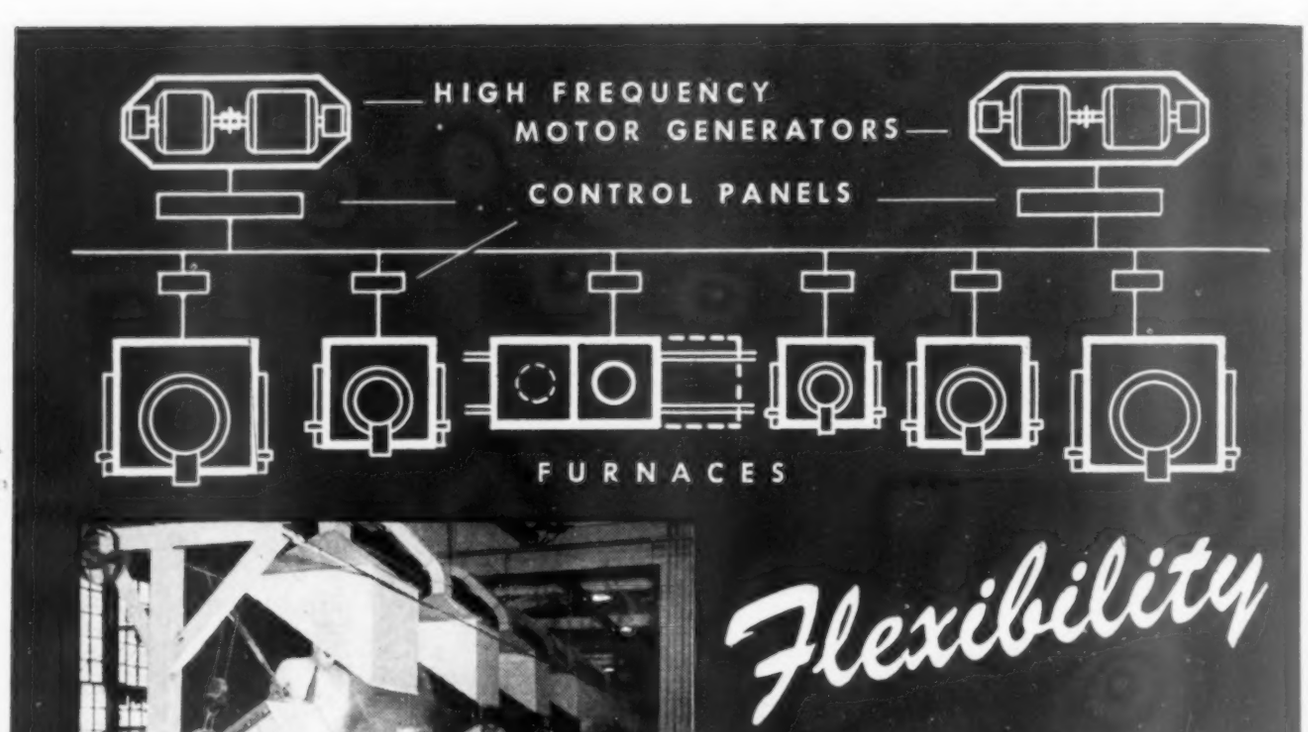
A single valve operates the core box clamp, clamps same against the blow plate, blows the core, exhausts and releases the clamps in the proper cycle. Rigid one-piece, cast steel frame insures accurate alignment of core box and blow plate. Patented Air-Operated Hydraulic Clamp locks the core box securely against split box separation.

Champion Core Blowers could be the answer to that most puzzling problem of man-power.



Champion Core Blowers
MODEL CB-400

CHAMPION
FOUNDRY & MACHINE CO.
1318 West 21st Street Chicago 8, Illinois



Flexibility IN STEEL MELTING

To handle those frequent rush orders with quick changes in special alloys and sizes of melts, you need the flexibility of Ajax-Northrup high frequency melting.

Here's what you can do with layouts like those shown: Each motor-generator set can be switched to any furnace — in any sequence. If you're busy, the motor-generators will rarely stand idle. You can do any large casting up to the combined capacity of your four biggest furnaces, and there's a furnace that is just right for efficient melting on smaller jobs.

You'll have the added advantage of greater speed, no contamination, faster alloying (it stirs as it melts), and ideal working conditions.

FOR SMALL FOUNDRIES

This new, self-contained Ajax-Northrup melting unit is ideal for small non-ferrous metal foundries. Lift-type furnace coil fits No. 70 pot, melts 200 pounds of brass in 50 minutes. Compact, simple to control, cool working conditions.

71

CONSULT OUR "KNOW-HOW"

By selecting the right combination of Ajax-Northrup units with the right controls, we can tailor high frequency melting to your requirements. Furnaces in sizes from 1 ounce to 8 tons, and frequencies to 1,000,000 cycles.

AJAX NORTHRUP *Since 1916*

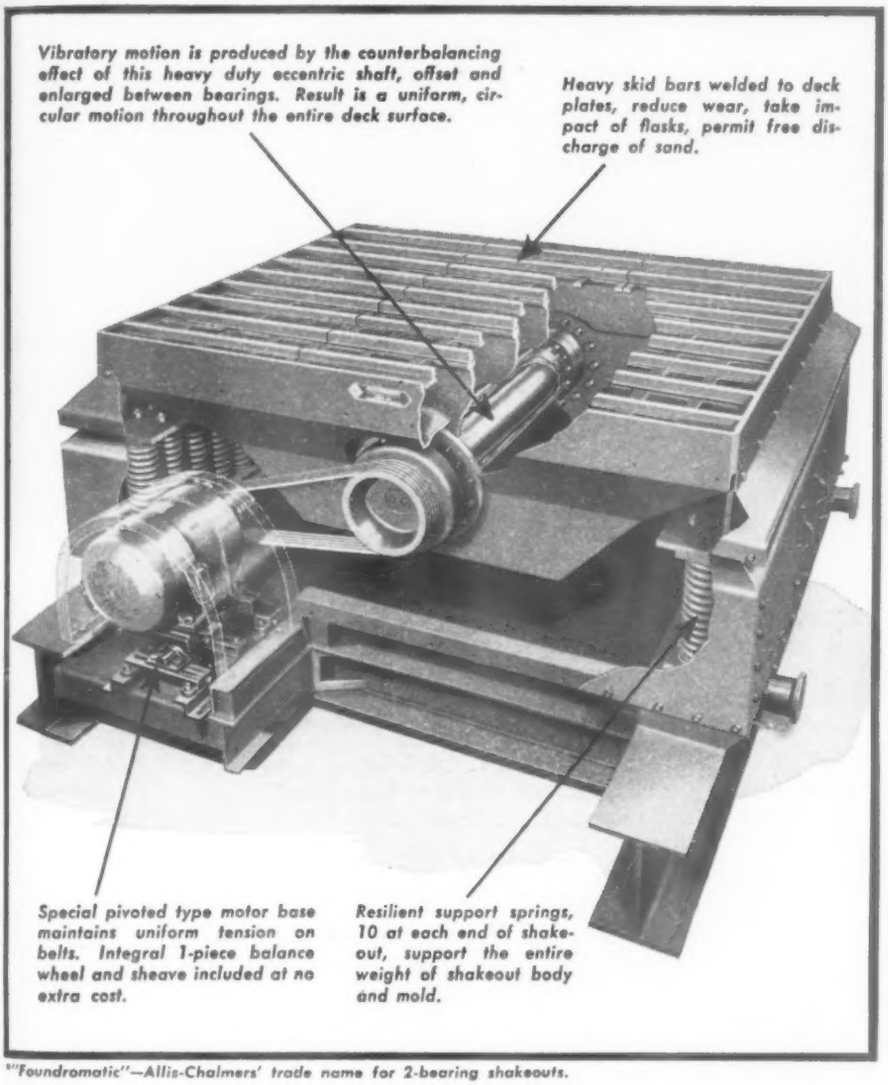
AJAX ELECTROTHERMIC CORP., AJAX PARK, TRENTON 5, N. J.

HIGH-FREQUENCY HEATING · MELTING

AJAX METAL COMPANY, Non-Ferrous Ingot Metals and Alloys for Foundry Use
AJAX ELECTRIC FURNACE CORP., Ajax-Wyatt Induction Furnaces for Melting
AJAX ELECTRIC CO., INC. The Ajax-Hultgren Electric Salt Bath Furnace
AJAX ENGINEERING CORP., Ajax-Tama-Wyatt Aluminum Melting Induction Furnaces

ASSOCIATE COMPANIES

"FOUNDROMATIC"* OPERATION REVEALS IMPORTANT SAVINGS


Vibratory motion is produced by the counterbalancing effect of this heavy duty eccentric shaft, offset and enlarged between bearings. Result is a uniform, circular motion throughout the entire deck surface.
Heavy skid bars welded to deck plates, reduce wear, take impact of flasks, permit free discharge of sand.
Special pivoted type motor base maintains uniform tension on belts. Integral 1-piece balance wheel and sheave included at no extra cost.
Resilient support springs, 10 at each end of shakeout, support the entire weight of shakeout body and mold.

*"Foundromatic"—Allis-Chalmers' trade name for 2-bearing shakeouts.

New, modern, high-speed "Foundromatic" shakeouts reduce operating time from hours down to minutes or seconds over older, less efficient methods. And they not only save time, but increase capacity, reduce flask breakage—handle a wide range of shapes and sizes of flasks and castings! Why not plan, at your convenience, to see "Foundromatic" shakeout in operation at Milwaukee? Make arrangements through our nearby district office, or directly with Allis-Chalmers, Milwaukee.

A1966

New 25 Ton Capacity Single Unit Shakeout Handles 90% of Tonnage Cast in Average Jobbing Foundry, Is Low in First Cost, Maintenance

MILWAUKEE, WIS. — Allis-Chalmers new 2-bearing "Foundromatic," world's most heavily constructed shakeout, is supplanting 4-bearing units on heavy-duty applications and in operations where there is wide range in weights of loads to be handled.

Offered in 8 x 10 ft, 25 ton; 6 x 8 ft, 18 ton; 5 x 8 ft, 12 ton; 5 x 8 ft, 7½ ton; and 4 x 6 ft, 6 ton capacities, the new shakeouts promise important savings. *Lower initial cost*—entire production handled on single unit.

A-C Substations Lowering Arc Furnace Costs

Foundrymen are using Allis-Chalmers complete sub-stations to get extra melts per day from arc furnaces—at lower cost. Economy features are quick-acting "Regulex" electrode control, and low maintenance disconnect switch.

This extra value is typical of A-C equipment for the foundry industry — Screens, Crushers, Hearth Furnaces, Kilns, Motors, Starters, Texrope Drives, Pumps, Blowers, Compressors, Furnace Transformers, etc.

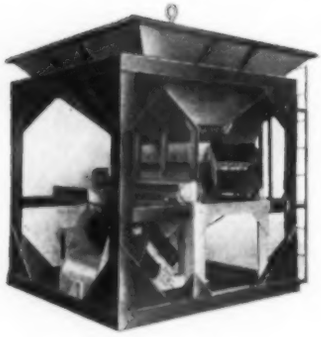
Big capacity — largest of any single mechanical unit. *Reduced* operating cost — *lower* power consumption; *lower* maintenance — only 2 bearings to maintain; and important savings in space.

For complete details, contact our nearby district office, or write for Bulletin B6365. ALLIS-CHALMERS, MILWAUKEE.

ALLIS-CHALMERS EQUIPMENT FOR THE FOUNDRY INDUSTRY

"I DON'T KNOW HOW WE COULD RUN OUR PLANT WITHOUT THEM!"

One of the five Royers at Progressive Foundry, Perry, Iowa.



Royer Model "RC" Combination Scrap Remover and Sand Conditioner has a capacity of 40 to 50 tons of correctly prepared sand per hour.

Progressive Foundry Co. of Perry, Iowa, writes:

"We have five Royer NC-2 machines that have been used in our plant six days a week since 1942, and to be honest with you, I don't know how we could run our plant without them. The upkeep of these machines is practically nil, and they seem to operate forever without giving any trouble. We are well satisfied with them."

This statement is typical of the opinion of Royer users. Foundries using Royers feel that they could not get along without them because only the Royer provides the six essential functions of thorough sand preparation:

1. Automatic removal of contamination.
2. Reducing the sand to a smooth, even texture, free of lumps.
3. Proper blending of old sand, new sand and bond.
4. Correct distribution of moisture.
5. Increased permeability.
6. Double aeration: on the belt and during discharge.

The clean, open, velvety sand discharged by the Royer provides smoother casting surfaces, which result in lower cleaning room costs. It minimizes surface defects, run outs and blows, reducing discount losses substantially.

Too, the Royer minimizes sand conditioning costs, as the only labor required is shoveling the sand into the hopper. The rugged, trouble-free machine does all the rest. The low upkeep referred to in the above letter is built into the Royer by the practical foundrymen who designed and produce it.

Over 7,600 Royers are now in service. There is a model, portable or stationary, for every class and size of foundry. Write for Bulletin 744.

ROYER

FOREMOST IN SAND CONDITIONING EQUIPMENT

ROYER FOUNDRY & MACHINE CO.

KINGSTON, PENNSYLVANIA

NON-BURN SLIP JACKETS

Are Not Affected by Run-outs and Spill-overs

On jackets over 8" deep, double angle iron reinforcements are used as illustrated.

On jackets up to 8" deep, a single angle iron is used.

Now you can put an end to expensive, time-consuming troubles due to unsatisfactory slip jackets. Use CMD NON-BURN, NON-WARP jackets! They are specially designed to withstand run-outs and spill-overs without damage. These non-sticking jackets will strip perfectly clean and last far longer than ordinary types.

• • •

FOR MORE INFORMATION WRITE FOR CIRCULAR!

CHICAGO MANUFACTURING AND DISTRIBUTING CO.

1928 WEST 46th STREET **CHICAGO 9, ILLINOIS**

DELTA

CORE AND MOLD WASHES

for

MORE PERFECT CASTINGS
LOWER CLEANING ROOM COSTS
LESS SCRAP IN MACHINING

Here are THREE IMPORTANT REASONS why MORE FOUNDRIES use DELTA CORE and MOLD WASHES to SPEED PRODUCTION and REDUCE COSTS.

Delta Core and Mold Washes "Anchor" themselves by penetrating from 3 to 5 grains deep into the sand.

This bond between the wash and the sand... a distinctive DELTA characteristic... produces an expansion-resisting coating essential to the production of finer finished castings.

The hot strength of Delta Core and Mold Washes increases with each degree of temperature rise from 1800°F to 3000°F providing maximum critical hot strength for all foundry applications.

The higher hot strength of DELTA Core and Mold Washes eliminates surface sand fissuring, excessive sand expansion and distortion.

No gas leakage through Delta Core and Mold washed surfaces. Gases produced by decomposition of organic binders in the core sand cannot leak through Delta Core and Mold washed surfaces to contact the molten metal.

Only DELTA Core and Mold Washes provide this unique and all-important insurance against defective castings resulting from gas leakage. DELTA Core and Mold Washes insure more perfect castings with finer finished surfaces.

Write for additional information

DELTA CORE AND MOLD WASHES

BASE MATERIAL
Mix with silica flour and water to produce finished base

FOR STEEL—STEELKOAT
Special Core & Mold Wash

FOR GREY IRON AND MALLEABLE
GraKoat—BlacKoat—Hi-Temp

FOR NON-FERROUS METALS
Non-FerrusKoat

FOR ALL SAND CAST METALS
THERMOKOAT—It's Plasti-Lastic

FOR UNUSUALLY HIGH TEMPERATURE CONDITIONS
Z-KOAT—High-fusion-temp wash

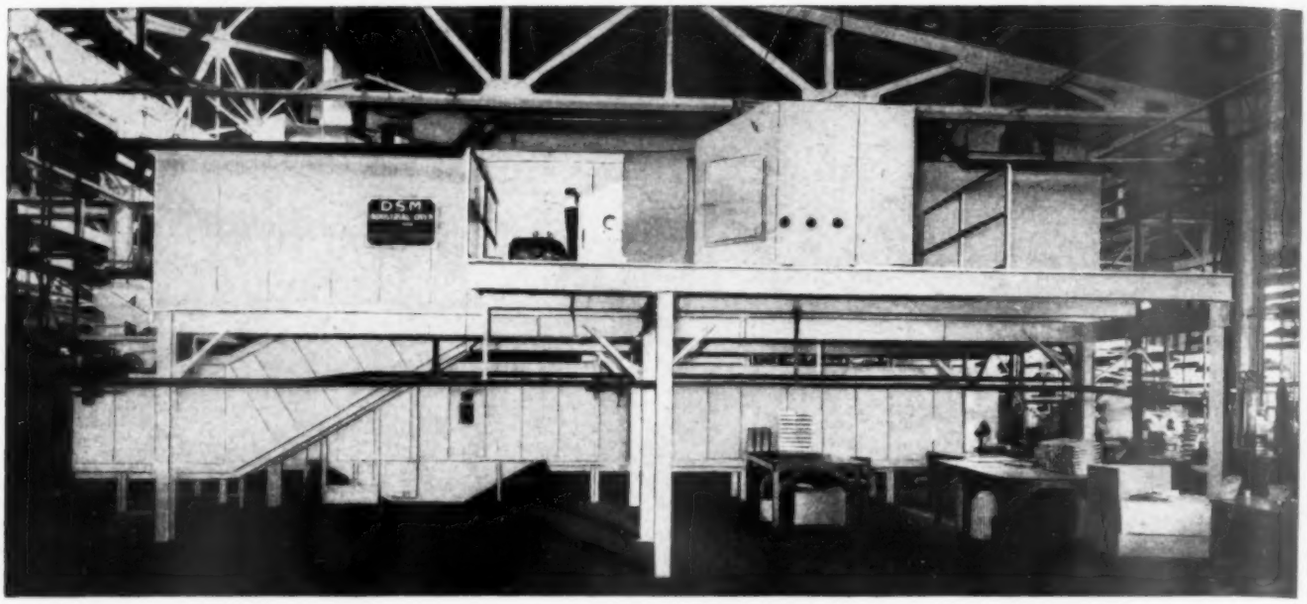
DELTA OIL PRODUCTS CO.
MANUFACTURERS OF FOUNDRY PRODUCTS, INDUSTRIAL AND AUTOMOTIVE OILS, GREASES AND COMPOUNDS
MILWAUKEE 9, WIS., U. S. A.

APEX 50 ALLOY

Apex 50 Aluminum Alloy is a proved alloy for its versatility in the manufacture of sand and permanent mold castings. Apex 50 Alloy assures you of economy in production and of quality castings. Booklet with full information furnished on request.

Apex Smelting Company 2537 W. Taylor St., Chicago

Research Leadership back of every Ingot



CUSTOM BUILT HIGH CAPACITY INSTALLATION

DSM

CROSS FLOW CIRCULATION

FOR ACTUAL SURFACE CONTACT

Properly applied, DSM designed CROSS FLOW heating systems effects a gentle wiping action on all surfaces—sides —tops—bottoms—of your product, to be dried or processed. Resulting in speedier baking and a more uniform product.

Drying from center outwards avoids case hardening

WE WANT TO BUILD ***YOUR*** *OVENS*

PLANT ENGINEERING: *Consulting assistance in plant layout to coordinate departmental operations, our experience dated from 1917 in this field.*

Such plant layout may be based on increasing production beyond present capacity, or it may be a rearrangement in this post-war period when operations are conducted under a new set of conditions.

MOTOR CLEANING EQUIPMENT: *Washing machines for cleaning teardowns. Kerosene spray or similar solvent usually used as the cleaning medium.*

FORMED COWLINGS, PANELS, ETC.: *To your specifications, and of light metal alloys as required. Weldments and brazed assemblies may be under controlled atmosphere.*

PILOT EQUIPMENT: *Sample size equipment for development of heavy equipment.*

VERTICAL CORE BAKING OVENS • CONTINUOUS HORIZONTAL BAKING OVENS • BATCH TYPE CABINET OVENS • DRAWER OVENS

DETROIT SHEET METAL WORKS
1270 OAKMAN BOULEVARD, DETROIT 6, MICHIGAN

METAL FINISHING EQUIPMENT *by*

DETROIT SHEET METAL WORKS

1306 Oakman Boulevard DETROIT -6- MICHIGAN

DSM INDUSTRIAL OVEN
SERIAL
DESIGNED AND BUILT BY
DETROIT SHEET METAL WORKS
DETROIT, MICH. U.S.A.

PAINT SPRAY HEATING, VENTILATING, COOLING, DRYING, HUMIDIFYING SYSTEMS, JAPANNING AND INDUSTRIAL OVENS, INDUSTRIAL WASHING MACHINES

Amazing New Postwar Transporter Lifts Loads Faster... *Moves Loads Easier!*

Adds New Efficiency, Longer Life to Miracle Electric Truck

Yes, you get more—much more in the amazing NEW, POSTWAR TRANSPORTER—the miracle electric truck long famed for cutting handling costs in half and taking the work out of every material moving job.

Astounding new money, time and work saving features have been added. Developments that lift loads faster, move them easier, give longer life and greater efficiency to a unit already noted for energy-saving performance.

With practically everything new but the hardware, the features below only highlight what you will get in the 1946 Transporter. Send the coupon. Get *all* the facts, before you decide on any motorized hand truck.

"TOUCH-OF-YOUR-THUMB" EASE, *says... "MUSCLE MIKE"*

The new 3-second Lift Pedal contains two pistons or cylinders, the high pressure (low speed) cylinder being housed inside the low pressure (high speed) piston. Both cylinders are actuated by the cam when the foot pedal is depressed. One stroke of the foot pedal is all that is required to engage skid.

When load resistance is encountered, the fluid from the larger or low pressure cylinder by-passes back into the reservoir, and the high pressure cylinder is employed to raise the load.
So the first stroke of the foot pedal engages the load, and two more strokes raise the load sufficiently to move.

2 EASY TO GET AT POWER UNIT

Changes in design have been made, so that all parts of the power unit are easily accessible. The wiring system has been simplified, and component parts compactly placed where they can be reached easily for lubrication, and inspection.

3 NEW SAFETY BRAKE

Complete "dead-man" control is assured by a double shoe external contracting type larger diameter brake, which provides four to five times more braking effort. This gives you a Positive Mechanical Brake more efficient and safer the instant control handle is released to upright position.

FOOT PEDAL HINGES BACK FOR SHORTER TURNING RADIUS

To provide a shorter turning radius, the foot pedal is hinged back when not in use for lifting.

4 Double-Pitch Reduction Chain Drive Prolongs life of unit.

5 New Magnetic Contactor Utilizes Silver Alloy Tips to give ten times more life.

6 Carbon Brushes in Commutator Type Collector Ring Replace Copper Fingers to eliminate lubrication, increase wearing quality.

Approved by Underwriters' Laboratories, Inc.

Transporter
A PRODUCT OF AUTOMATIC
Lightens LIFE'S LOADS

AUTOMATIC TRANSPORTATION COMPANY
Div. of The Yale & Towne Mfg. Co.
121 West 87th St., Dept. T, Chicago 20, Illinois
Please mail me without cost or obligation, complete facts about the NEW Postwar TRANSPORTER.
( ) Have an A. T. C. Specialist call and survey my material handling costs.
Company Name.....
By.....Position.....
Street Address.....
City.....State.....

LOOK TO THE LEADER FOR ALL THAT'S NEW

Would you say your grinding is perfect?

Unless a complete analysis of your grinding has been made...unless the correct wheels and machines are on your job . . . the best you can have is second best.

But you can have grinding second to none in production speed and low cost if you shift to Peninsular job-designed wheels.

For best results, call in Peninsular engineers. They study your machines, they study your grinding methods, they study the metals you grind. Their findings are used to develop grinding wheels and machines for maximum production speed.

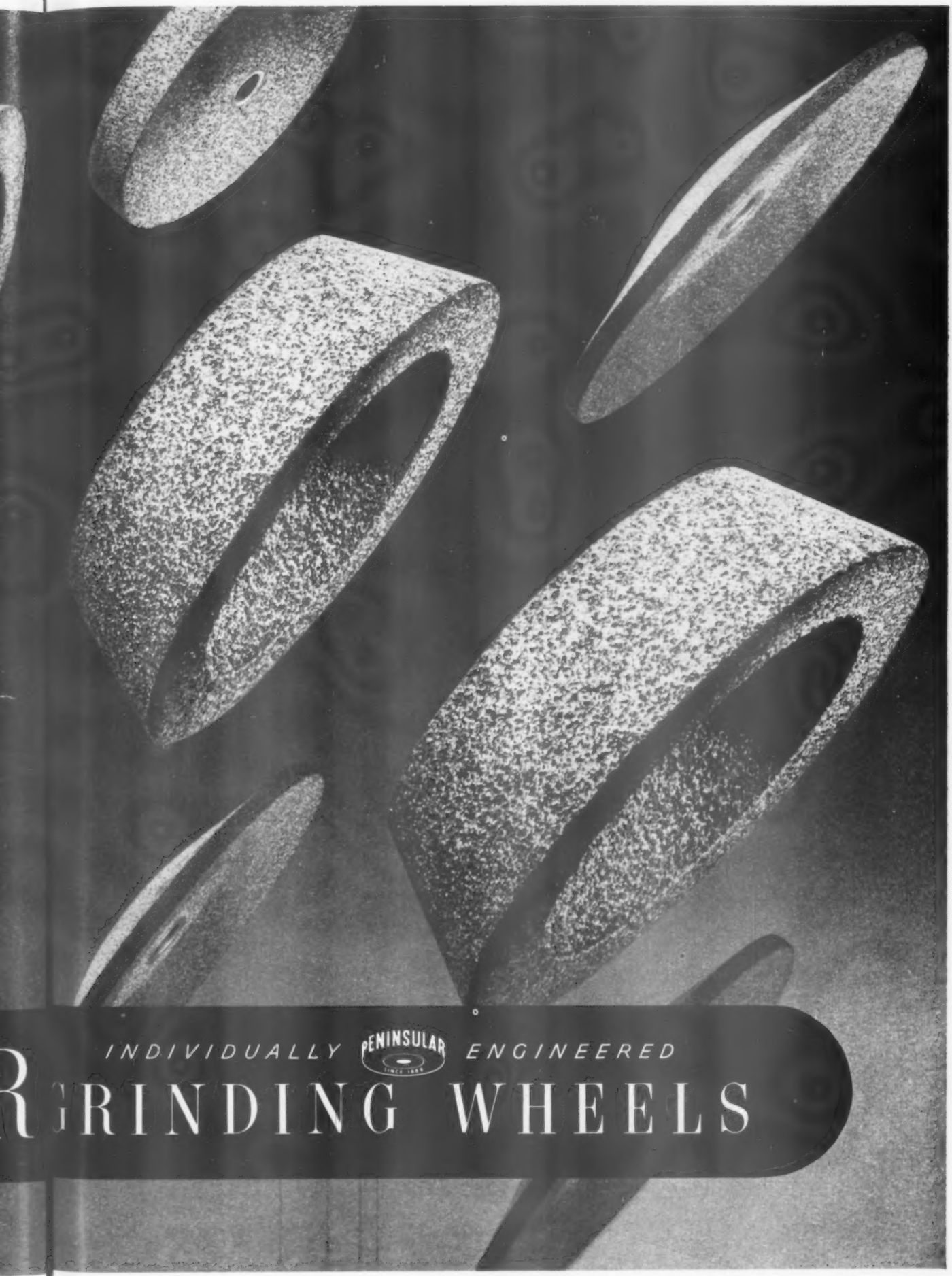
Peninsular can show you the way to reduced grinding costs that will be worth your while. *Every* Peninsular grinding wheel is specially made for its particular job.

The Peninsular Grinding Wheel Co., 729 Meldrum Ave., Detroit 7. *Sales Offices:* Chicago, Philadelphia, Boston, Buffalo, Cleveland, Newark, Pittsburgh, Houston, St. Louis, Cincinnati.

PENINSULAR

SINCE 1889

SPECIALISTS IN RESINOID BONDED WHEELS


INDIVIDUALLY PENINSULAR ENGINEERED
GRINDING WHEELS

THE HOUGH Payloader

ESSENTIAL IN EVERY FOUNDRY!

Now, with rising production costs—price regulation—increased labor difficulties—you need a Hough Payloader more than ever before. For the speedy little Payloader can help step in and break the production bottleneck of material handling. It eliminates slow costly wheelbarrow crews—speeds up handling of core and moulding sand—assures continuous production and maximum foundry efficiency. One foundry saved over 5000 manhours of labor in a four month period—plus greatly increased production and lower costs.

The Payloader is built small but powerful—operates in congested areas, in narrow aisles, inside of bins or railroad cars—one man operated, it loads, carries and dumps—can pull trailers or handle castings with special lift fork; can be used for snow removal and general plant maintenance the year 'round.

Check up now on the many advantages the Payloader provides. Over 100 Foundries are now using Payloaders.

GET COMPLETE DETAILS

Send for this new catalog containing complete information, action pictures, mechanical details and specifications on the HA Payloader.

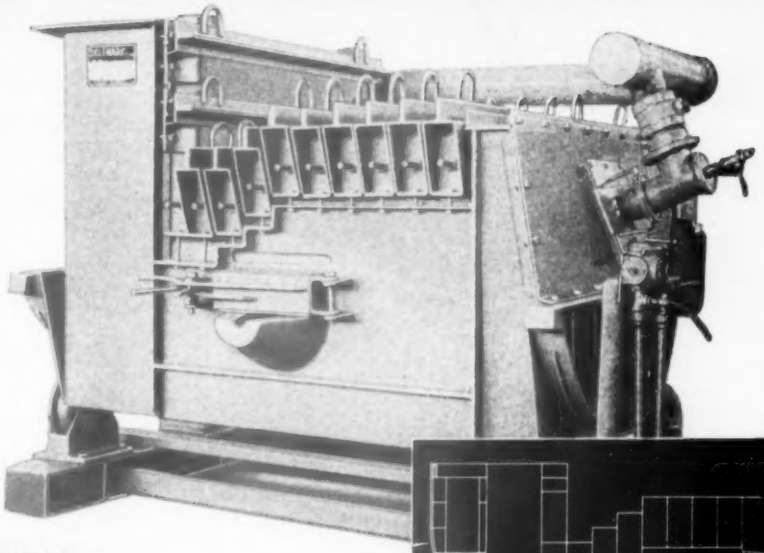
THE FRANK G. HOUGH CO.

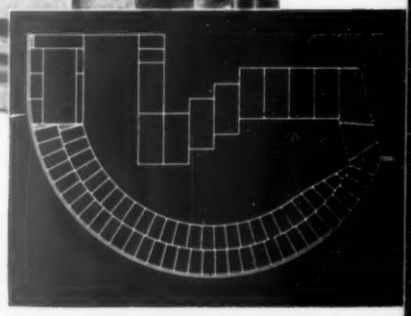
MATERIAL HANDLING EQUIPMENT • LIBERTYVILLE, ILL.

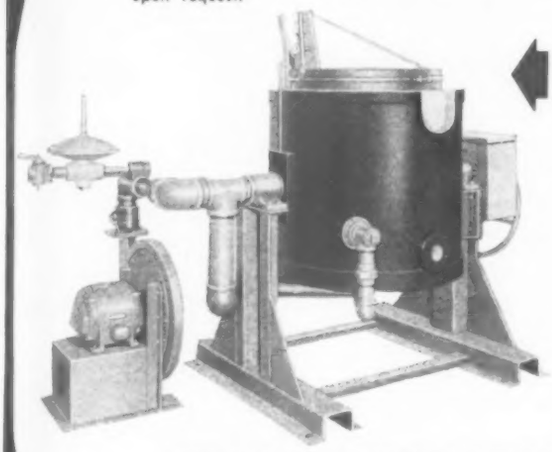
Speed + STAMINA = STROMAN FURNACE PERFORMANCE

SKLENAR FURNACES

For Melting Brass, Bronze, Aluminum, Sklenar Non-Crucible, Direct Fired, Improved Reverberatory Melting Furnaces are the fastest melting furnaces built. Their design is unique. Metal is charged into a hopper which is also an exhaust from the combustion chamber. Here metal is preheated and melted at the throat of the hopper. Cold metal does not reach the molten bath. Charging is continuous. These furnaces will show fuel savings up to 40%; as the combustion chamber is heated by the some fuel used to melt metal in the throat of the hopper. They are also very successful in the making of Grey Iron Castings. The furnace Illustrated is the 1000 lb. size, and is gas fired Oil fire is also available. Full information upon request.







STROMAN MANUAL TILT CRUCIBLE MELTING FURNACES

For Brass, Bronze, Aluminum

This illustrates a gas fired unit with two gas burners. Accessories for the mixing of gas and air in correct proportions are also shown and are furnished with the unit. This is the most modern and efficient means of burning gas that is known today. Furnaces up to and including No. 100 crucible are equipped with one gas burner. Larger sizes are furnished with two burners.

STROMAN CRUCIBLE STATIONARY MELTING FURNACES

For Brass, Bronze, Aluminum and other non-ferrous metals

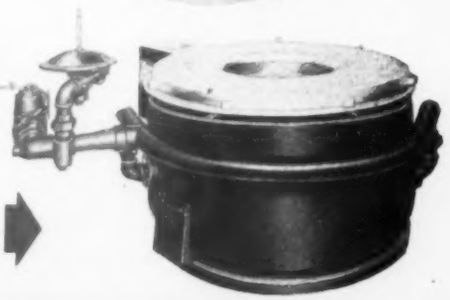
Sturdy, efficient and featuring the Stroman Push-Back Cover, these stationary furnaces are designed for peak production and greatest fuel economy. Oil or Gas Fire. Capacities from No. 20 to No. 400 Crucible.

Write immediately for full information TO NEW ADDRESS

STROMAN STATIONARY CRUCIBLE MELTING FURNACES

For Aluminum and other White Metal Alloys

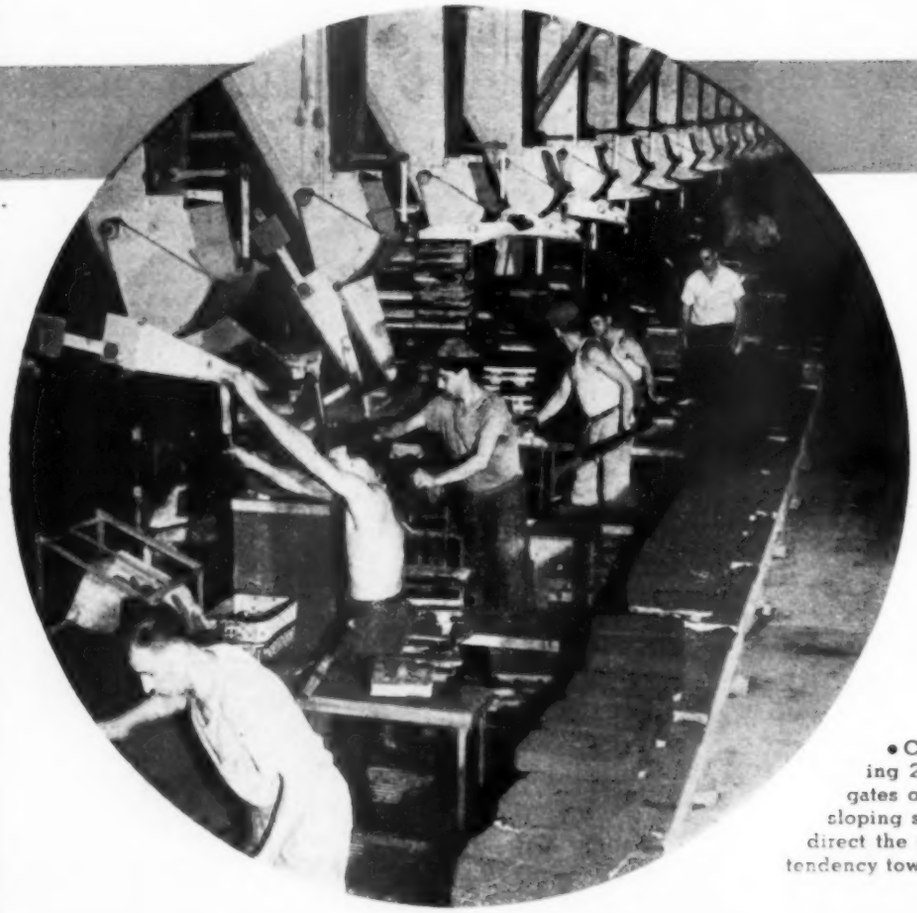
These furnaces are designed primarily for use in permanent mold and die casting plants. They are equipped with a special shield to protect operators against excessive heat . . . are most efficient in operation . . . and handle capacities from 200 to 820 pounds of Aluminum. They may also be used as holding or breakdown furnaces. Oil or Gas fired.



STROMAN FURNACE & ENGINEERING CO.

DIVISION OF

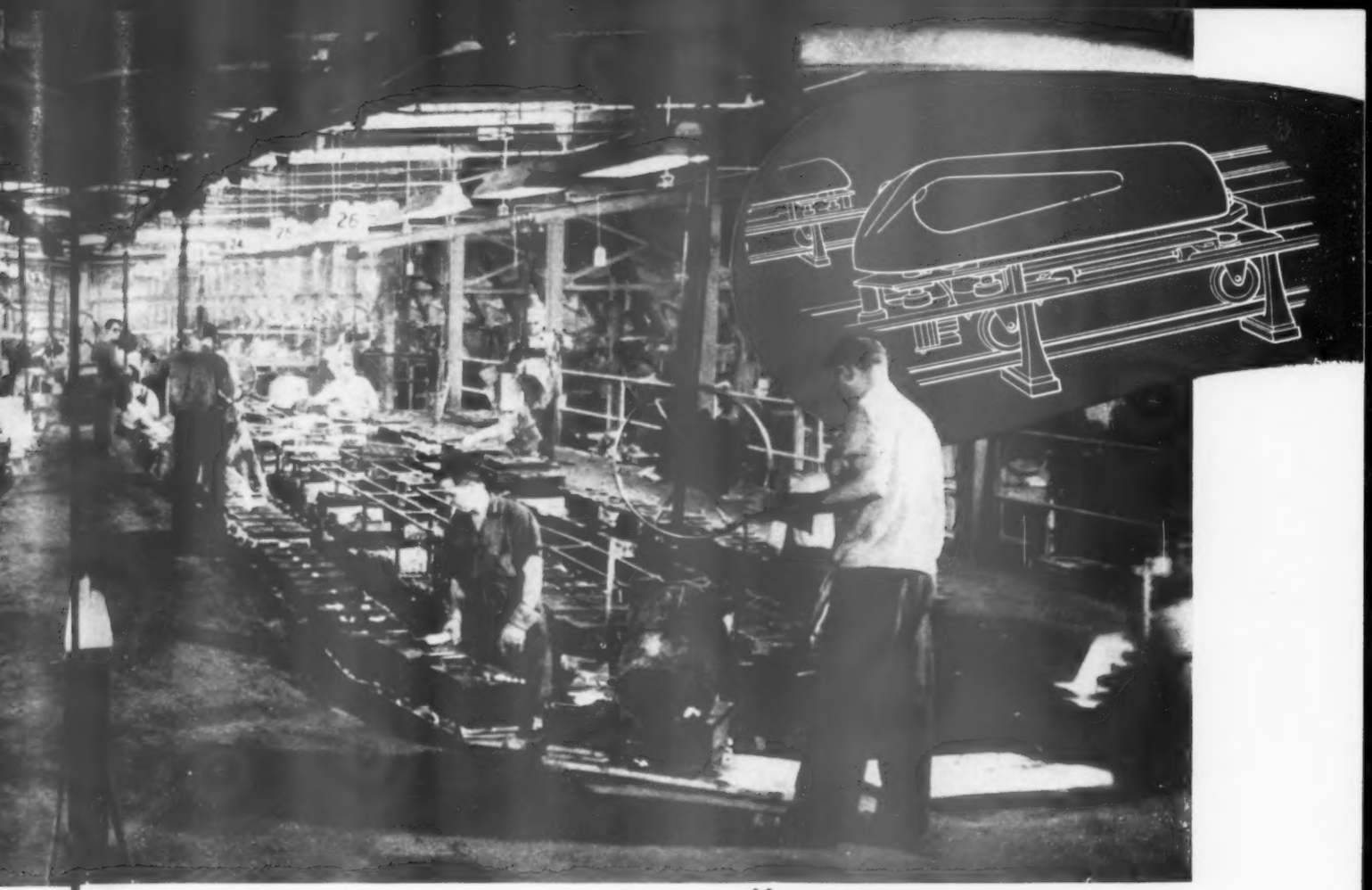
THE PETERSEN OVEN CO. • 9900 FRANKLIN AVE. • FRANKLIN PARK, ILL.



How a ...increase

• Top: Pouring zone showing the 2 National Mono-Roll units. On train at right pouring is nearly completed—weight man is lifting weights from the molds and placing them on storage rack in the center of the conveyor. Soon the Klaxon will sound and train will move to the cooling zone. At left one train is moving from the pouring zone while another train-load of molds is moving into the zone. Electric locomotive is moving from left to right—weight man has a flask weight ready to set on a mold when train stops.

• Circle left: Line of 18 molders at work, each loading 2 cars of the train of 36 cars. Note the over-cut gates on the hoppers and their rounded corners on the sloping side to prevent "bridging." The swinging chutes direct the sand into the mold from the side, reducing the tendency toward "ram-offs."



a Foundry's "Railroads"

se production and lower costs

NATIONAL *Mono-Roll* MOLD CONVEYING SYSTEM

When the foundrymen of this large Textile Machinery manufacturer "play trains" it isn't a game. It's an answer to increased efficiency . . . better production in sand preparation and mold handling. Their management says: the National Mono-Roll System is so far superior to their old method that as soon as equipment is available they plan to mechanize their entire foundry.

They now have 2 Mono-Roll train-type semi-continuous mold conveyors — each consisting of 4 separate 36 car trains pulled by individual electric locomotives. They operate this way: Train remains stationary at molding zone until loaded, then moves to pouring zone, remaining stationary until molds are poured—from their it moves into the cooling zone, remaining for proper cooling period, after which it moves past shakeout point slowly to allow dumping of molds automatically or by hand.

Advantages: 1—Conveyor is stationary at molding, pouring and cooling zones. 2—Same car stops opposite same molder each time so that he always gets *his own* equipment back. Thus, it is possible to run any number of different-size flasks with no confusion.

How do you handle your molds? In *your* plans for greater production and lower costs for the future you need a modern handling system. A National Engineer will help you determine the suitable one for your foundry. Invite him to come in.

NATIONAL ENGINEERING COMPANY

MACHINERY HALL BUILDING • CHICAGO 6, ILLINOIS

Manufacturers and Selling Agents for Continental European Countries—The George Fischer Steel & Iron Works, Schaffhausen, Switzerland. For the British Possessions, Excluding Canada and Australia—August's Limited, Halifax, England. For Canada—Dominion Engineering Co., Ltd., Montreal, Canada. For Australia and New Zealand—Gibson, Battle & Co., Pty., Ltd. Sydney, Australia

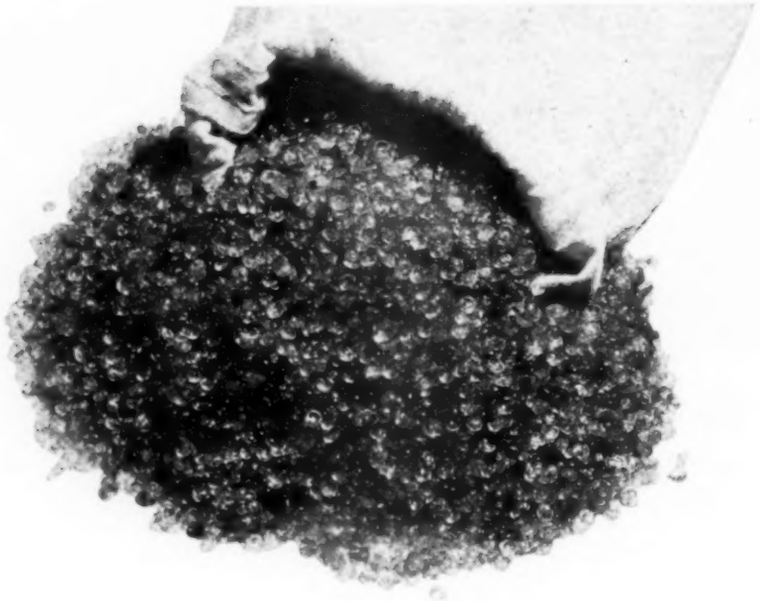
MANUFACTURER'S ASSOCIATION, INC. FOUNDRY EQUIPMENT

GLUE

FREEMAN BEAD GLUE

IMMEDIATE DELIVERY
ANY QUANTITY

WRITE FOR PRICES



GOLDEN COLOR

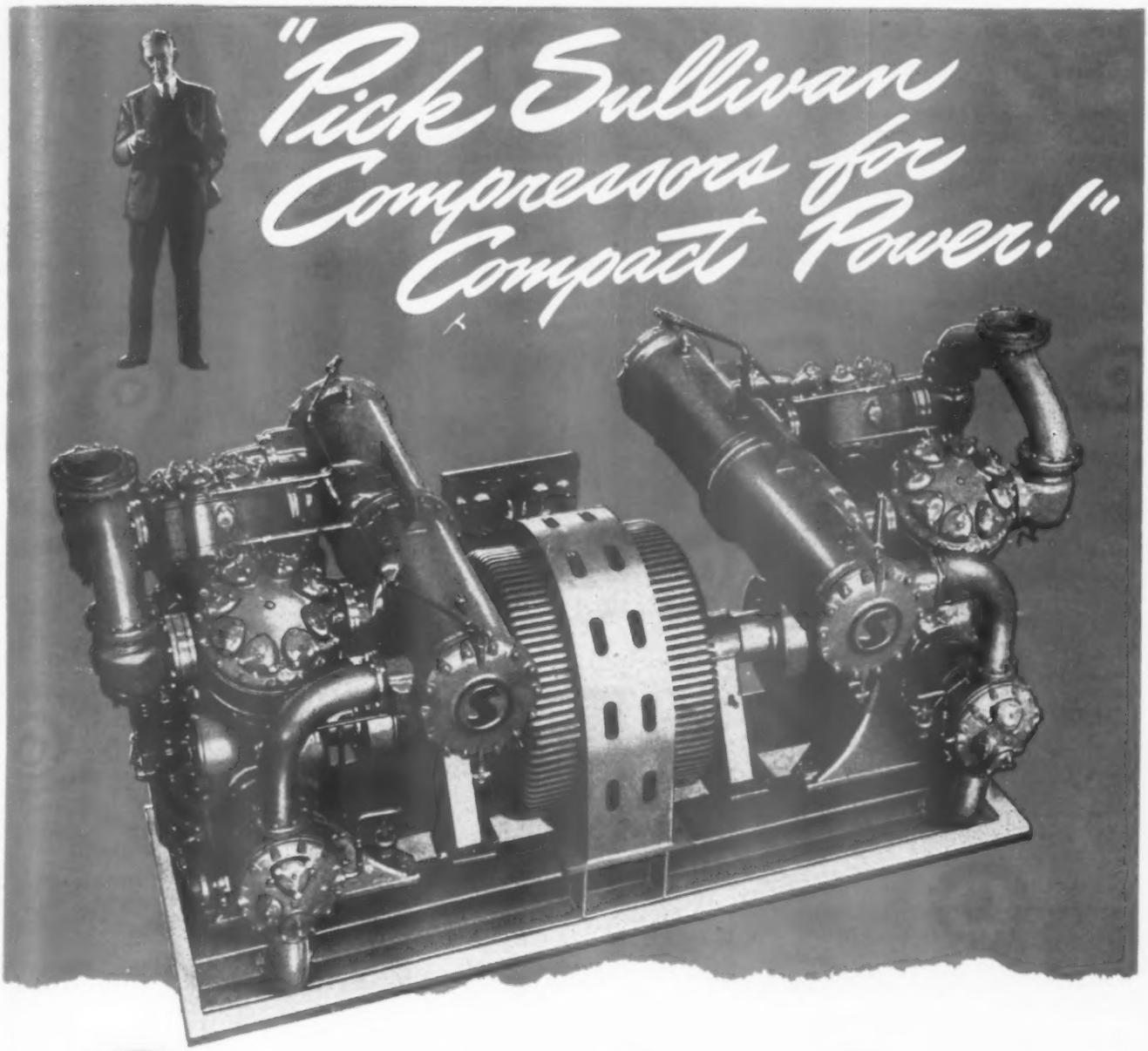
Our Bead Glue is made specially for pattern work. Quick setting with either pine or mahogany. When soaking just cover any amount of glue with water. Not necessary to weigh either glue or water.

A TRIAL ORDER WILL PROVE ITS MERIT

THE FREEMAN SUPPLY CO.

PATTERN SHOP and FOUNDRY SUPPLIES and EQUIPMENT—MAHOGANY and PINE PATTERN LUMBER

TOLEDO 5, OHIO



Rugged...Heavy Duty...Economical

WN-114 COMPRESSOR

TAKES LESS FLOOR SPACE—HAS HIGHER CAPACITY

DELIVERING AIR UP TO 3,656 CFM

SULLIVAN

PORTABLE AND STATIONARY AIR COMPRESSORS

W&D 1494

Consult a Joy Engineer

SULLIVAN DIVISION

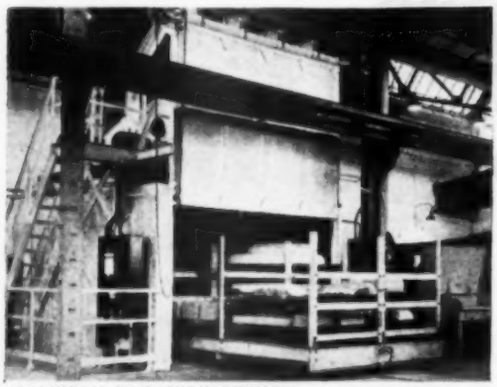
JOY MANUFACTURING CO.

GENERAL OFFICES: HENRY W. OLIVER BUILDING, PITTSBURGH, PA.

DO THE JOB BETTER

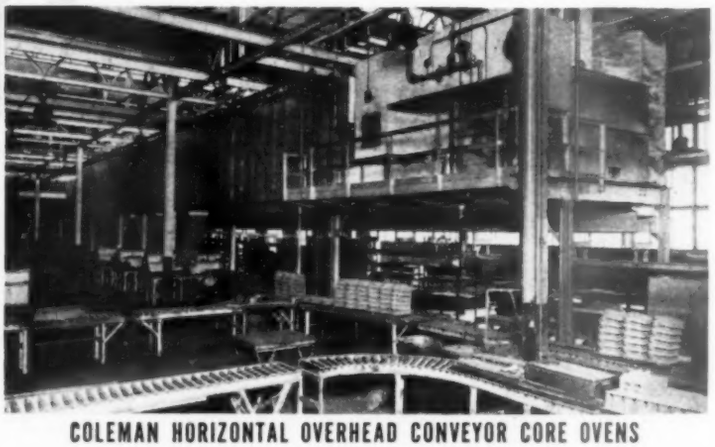
COLEMAN ROLLING DRAWER CORE OVENS for speedy baking of small and medium cores. Available in wide range of sizes and capacities.

COLEMAN TRANSRACK CORE OVENS for operation with portable racks. Single or double rack capacity.



COLEMAN CAR TYPE OVENS for heavy cores or molds. Most of the large core and mold ovens in operation in every class of foundry production are Coleman Car Type Ovens.

COLEMAN TOWER CORE OVENS for high speed production. Patented Open Center permits loading from both inside and outside the Tower and increases loading accessability as much as 300% compared with other vertical oven designs.



COLEMAN HORIZONTAL OVERHEAD CONVEYOR CORE OVENS for large scale specialized production.

COLEMAN CORE and MOLD OVENS

The FOUNDRY

CLEVELAND

BUILDERS OF COLEMAN

RAND CHEAPER *with* COLEMAN OVENS

Conventional types and specially engineered installations for every requirement!

When you choose a Coleman Oven you profit by experience which includes over 40 years of specialization in designing and building foundry ovens, and more than 9,000 successful installations of all types.

Coleman Ovens are famous for *fast, perfect baking with less fuel and less labor.* They have proved of amazing value in every class of foundry work—gray iron, malleable, steel, alloy, aluminum, magnesium, etc.

Coleman Ovens are built in all types and sizes to best meet each and every operating requirement. An investigation of Coleman Core and Mold Ovens to meet your own needs may disclose outstanding cost-cutting possibilities.

Perfect baking is guaranteed with all fuels. Coleman Ovens may be operated with any "automatic" fuel such as gas, oil, electricity, powdered or stoker coal, etc., whichever is most economical to obtain in your district.

Write for Folio of Coleman Oven Bulletins

More than **9,000** *Successful Installations*

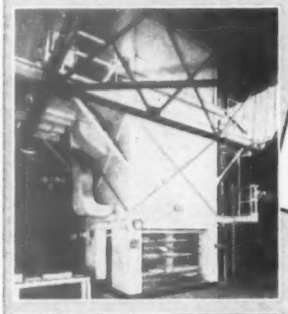
☆ WORLD'S OLDEST AND LARGEST FOUNDRY OVEN SPECIALISTS ☆

COLEMAN Portable Core Ovens

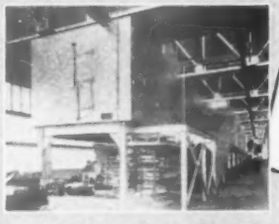
COLEMAN Rolling Drawer Ovens

COLEMAN Transrack Ovens

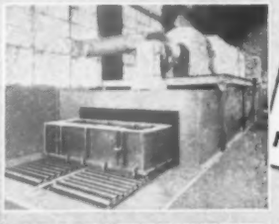
COLEMAN Car Type Ovens



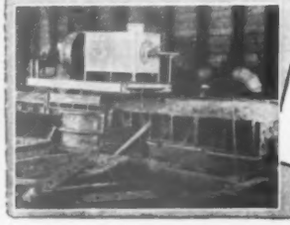
COLEMAN Tower Ovens



COLEMAN Horizontal Conveyor Ovens



COLEMAN Conveyor Mold Ovens



COLEMAN Portable Mold Dryers

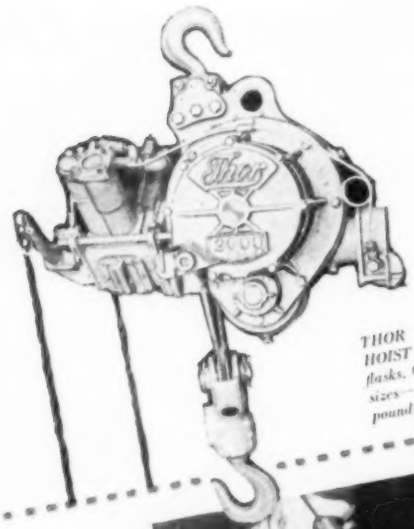
QUIPMENT *Company*

HIO, U. S. A.

MEMBER FOUNDRY EQUIPMENT

D SWARTWOUT OVENS

WHEN THE JOBS ARE TOUGH



THOR AIR MOTOR HOIST — *for handling flasks. Complete range of sizes—500 to 6,000 pounds capacity.*

MODERN Thor TOOLS

SIMPLIFY FOUNDRY OPERATIONS . . . . . SAVE TIME AND LABOR

THOR PNEUMATIC GRINDERS—*for cleaning room use. Complete range of portable grinders: (radial wheel type or surface type using cup grinding wheels.)*

THOR CHIPPING HAMMERS — *for cleaning room chipping. Complete line—all sizes, 3/4" to 4" stroke.*

THOR CORE BUSTERS—*for knocking out cores from castings.*

THOR PNEUMATIC RAMMERS—*a complete line for floor or bench work; core room and molding machine sand ramming, piercing and butting off.*

Shop men welcome the aid of powerful Thor Pneumatic Tools—because they get work done *easier* and faster. Net results are more production at lower cost. Thor Pneumatic tools provide the right combination of maximum power, light weight, perfect balance and smooth operation. Valuable *plus* features include: instant starting, positive control and extra rugged construction. Thor tools for foundry use are made in a wide range of styles and sizes. Ask a Thor engineer to give you all the facts—or, call your nearby Thor branch.

Thor PORTABLE POWER TOOLS

PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS

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Federated — MODERN HEADQUARTERS FOR NON-FERROUS METALS

TECHNICAL SERVICE—The engineering materials produced by modern smelters such as Federated are widely distributed to metal fabricators throughout the country. The problems of these diversified industries are manifold. Where metal problems are concerned, the services of Federated research engineers, metallurgists, and chemists are available to industry. Federated also employs service engineers who are in daily contact with metal users to assist in the solution of their problems. The services of these engineers are available without cost to you. This is your engineering staff, working for you, to make your products top quality.

FMD
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FEDERATED METALS DIVISION
American Smelting and Refining Company
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Nation-wide service with offices in principal cities

ALUMINUM • BRASS • BRONZE • BABBITT • DIE CASTING ALLOYS • LEAD PRODUCTS • SOLDER • TYPE METAL • ZINC DUST

IMPROVING STRUCTURE OF CHILLED IRON

Proof of FERROCARBO Briquette Effectiveness in De-oxidizing and Inoculating Iron

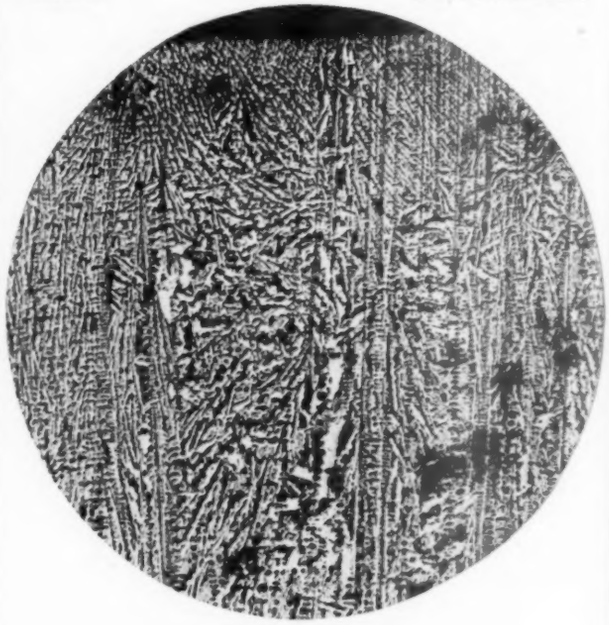
The effectiveness of FERROCARBO briquettes as an inoculant is strikingly portrayed in these photomicrographs of treated and untreated irons having similar compositions.

Note the much finer carbide structure of the FERROCARBO-treated iron. Compact and uniform, it possesses considerable strength and wear resistance. Toughness has been added without impairing hardness. The mottled zone is reduced.

Compare this with the coarse columnar chill structure of regular iron. Poor physical and machining properties are clearly indicated by the definite freezing lines. The wide, coarse mottled zone does not provide the chill with a backing at all comparable with that where FERROCARBO briquettes were used.

REGULAR IRON

Chilled Surface 50 X



FERROCARBO TREATED IRON

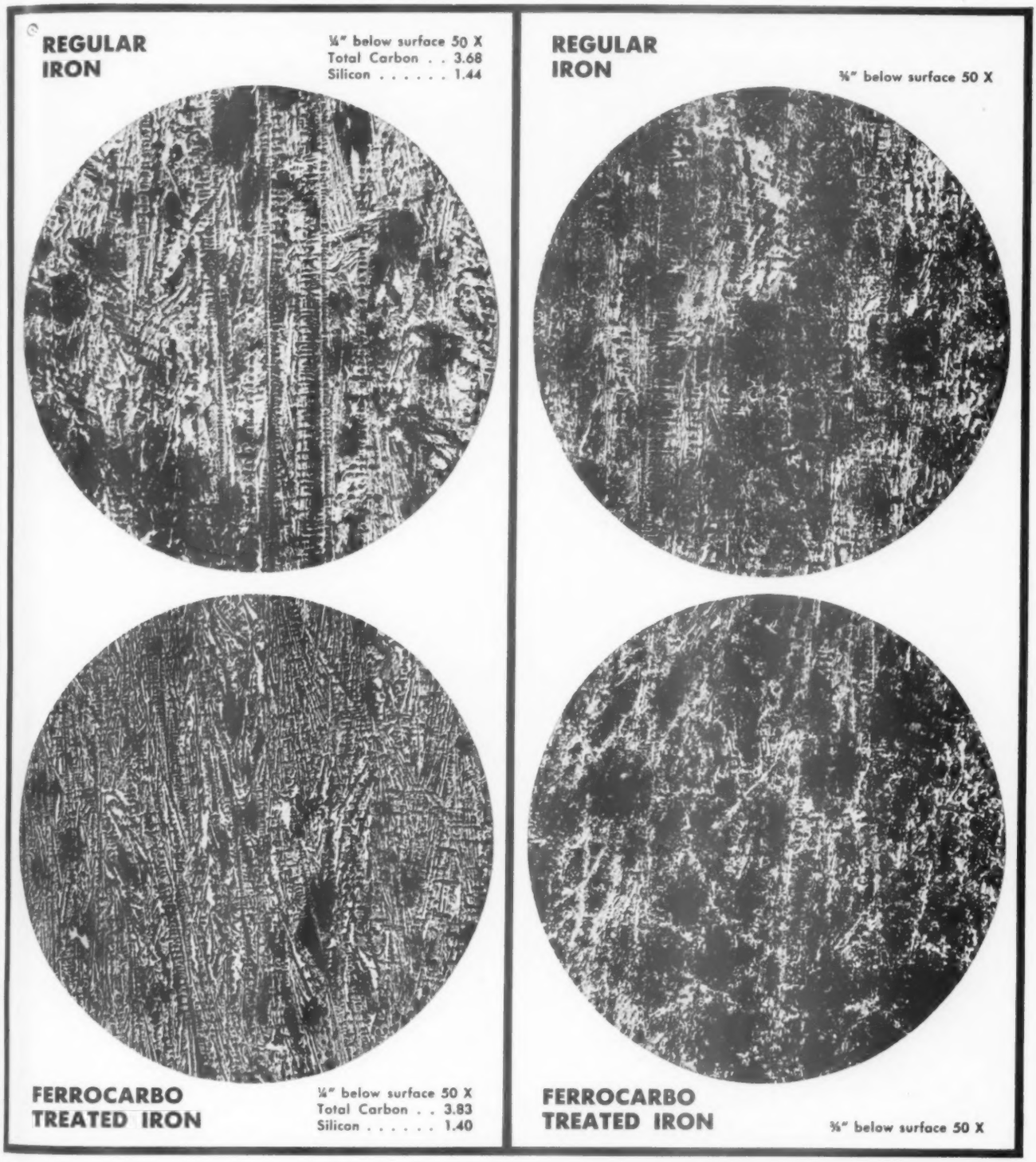
Chilled Surface 50 X

The structure of chilled irons is radically improved by the strong and prolonged inoculating action of FERROCARBO briquettes. Not only is the chilled area refined but the mottled zone is also considerably reduced. This gives a tough backing to the hard, chilled surface.

Machinability of medium and high strength irons also is materially bettered through the employment of FERROCARBO briquettes. Maximum physical properties are obtained through random graphite distribution. A finer carbide and pearlite structure is produced.

Easily added to the charge, FERROCARBO briquettes are the inoculating agent for chilled and high strength machinable iron that produces a ductile, tough and spall resistant iron carbide microstructure. Eliminated are the brittleness, spalls and hard spots of regular iron. Machine tool life is prolonged. Machining is made easier and better.

For specific information on the use of FERROCARBO briquettes in improving structure and physical properties, write Dept. L-106. Our metallurgists will gladly cooperate.


REGULAR IRON
¼" below surface 50 X
Total Carbon . . 3.68
Silicon 1.44
REGULAR IRON
¼" below surface 50 X
FERROCARBO TREATED IRON
¼" below surface 50 X
Total Carbon . . 3.83
Silicon 1.40
FERROCARBO TREATED IRON
¼" below surface 50 X

FERROCARBO Briquettes

BY CARBORUNDUM

TRADE MARK

THE CARBORUNDUM COMPANY, Refractories Division, Dept. L-106, Perth Amboy, New Jersey

FERROCARBO Distributors: Kerchner, Marshall & Co., Pittsburgh, Cleveland and Birmingham; Miller and Company, Chicago, St. Louis and Cincinnati

"Carborundum" and "Ferrocarbo" are registered trademarks which indicate manufacture by The Carborundum Company

MOLDING MACHINES

FOR PEAK PRODUCTION

FASTEST MOLDING . . . LOWEST MAINTENANCE

16-36 Type D Heavy Duty Jolt Squeeze Molding Machine with Pattern Drawing Device—Open End Frame—7" diameter jolt piston—16" diameter squeeze piston

Redesigned to a minimum of working parts, thereby greatly reducing maintenance cost and at the same time lowering operating costs through saving of labor.

TODAY—More than ever—foundrymen must rely upon their molding equipment to meet production schedules. They cannot afford to have a breakdown! These machines have played an important role in the success of many of the largest foundries. Their acceptance is due to their ability to "stand up" under the heaviest production.

Our Type D Molding Machines are built in nine sizes.

We invite you to write for particulars on the NICHOLLS 1946 model production line of Molding Machines, now equipped with push button controls.

Wm. H. NICHOLLS Co., Inc.

RICHMOND HILL, LONG ISLAND, NEW YORK

Established 1910

Foreign Manufacturers and Selling Agents—

For Continental Europe and Great Britain — The George Fischer Steel and Iron Works, Schaffhausen, Switzerland

NICHOLLS

Simplicity
FOUNDRY EQUIPMENT
For
Jobbing and Production Shops

Produce Cleaner Castings; Reclaim Valuable Sands; Cut Cleaning Room Costs; Eliminate Flask Breakage; Prevent Costly Shutdowns; and Increase Capacity with Reduced Man-power.

5-ft. x 10-ft. "B" Single Deck Sand Screen

3-ft. x 5-ft. "SS" Shake-Out in Production Shop

Simplicity foundry equipment includes Shake-outs, both Portable and permanent types; Knock-outs; Sand Screens; Portable and Semi-Portable Screening and Conditioning Units; Core Sand Lump Crushers; and Hot Castings Conveyors.

A typical expression from a Simplicity user: "We recently purchased a 6 x 8 Simplicity shake-out from the C. F. Braun Manufacturing Company of Alhambra, California. We are using this machine at present in our steel foundry and find the operation of this machine far surpasses your competitor's equipment.

Atlas Foundry & Machine Co.
Leo H. Long"

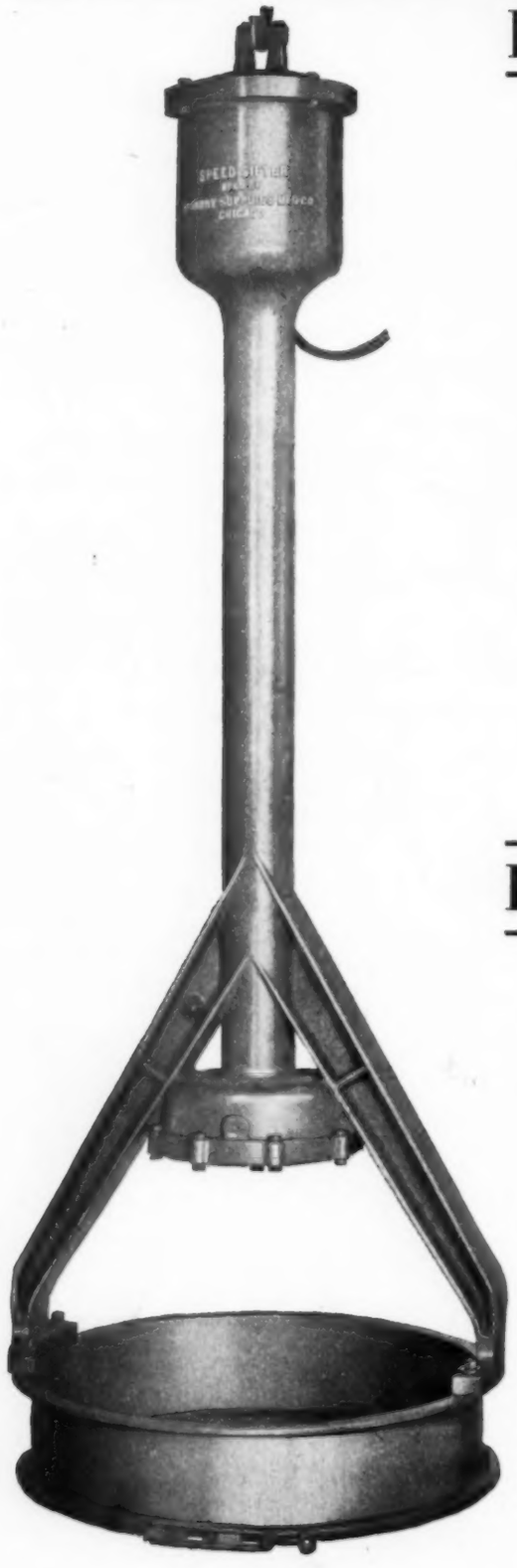
6-ft. x 17-ft. Dual Shake-Out in Jobbing Steel Foundry

Simplicity
TRADE MARK REGISTERED
ENGINEERING COMPANY
DURAND, MICHIGAN

Increase Production

with the

ROTOPLANE SPEED SIFTER ★ RED ELECTRIC VIBRATORS



ROTOPLANE SPEED SIFTER

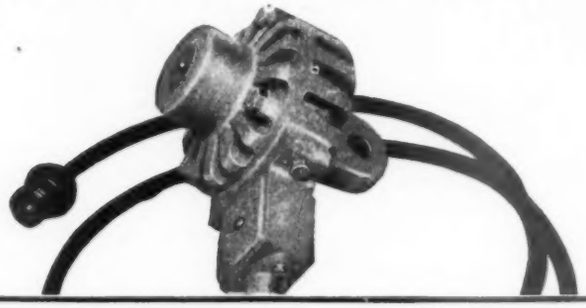
The ROTOPLANE Speed Sifter is an *improved* sand riddle of much greater capacity and much longer life. One size and type serves all purposes in the foundry—does *all* your sifting more quickly and economically.

It is easily handled by one man, weighs approx. 90 lbs., is 62 in. high overall. The one-piece frame of tough aluminum alloy makes for a remarkably effective vibration. Its smooth, free, rotary action vastly increases bearing life; all bearings grease packed. All mechanism of the ROTOPLANE is *completely* enclosed—no bearings or activating parts of any kind exposed to dust and grit.

The Quick-Change Sieves are instantly interchangeable, mounted in smooth, flat steel ferrule, with 20-inch diameter clear sifting area. No jagged edges to tear workers' hands, no storage problem.

$210.00 f. o. b. Chicago — complete with cable, safety ground wire. Standard 1/3 h. p. motor, 110 volt, 60 cycle, single phase.

UNIVERSAL FREE-WHEELING model equipped with motor as above $195.00



RED ELECTRIC VIBRATORS

True-to-pattern castings make satisfied customers . . . more repeat business. Increase your production and castings quality with RED Electric Vibrators. Sturdy, dustproof, lowest operating cost (electricity does not freeze). Unequaled for consistent year-'round results in foundries all over the world.

(All Prices f.o.b. Chicago)

No. 1—Light match plate work	$12.00
No. 2—Medium match plate work	15.60
No. 5—Heavy match plate, tub and bench work	20.40
No. 9—Machine and heavier work	28.80

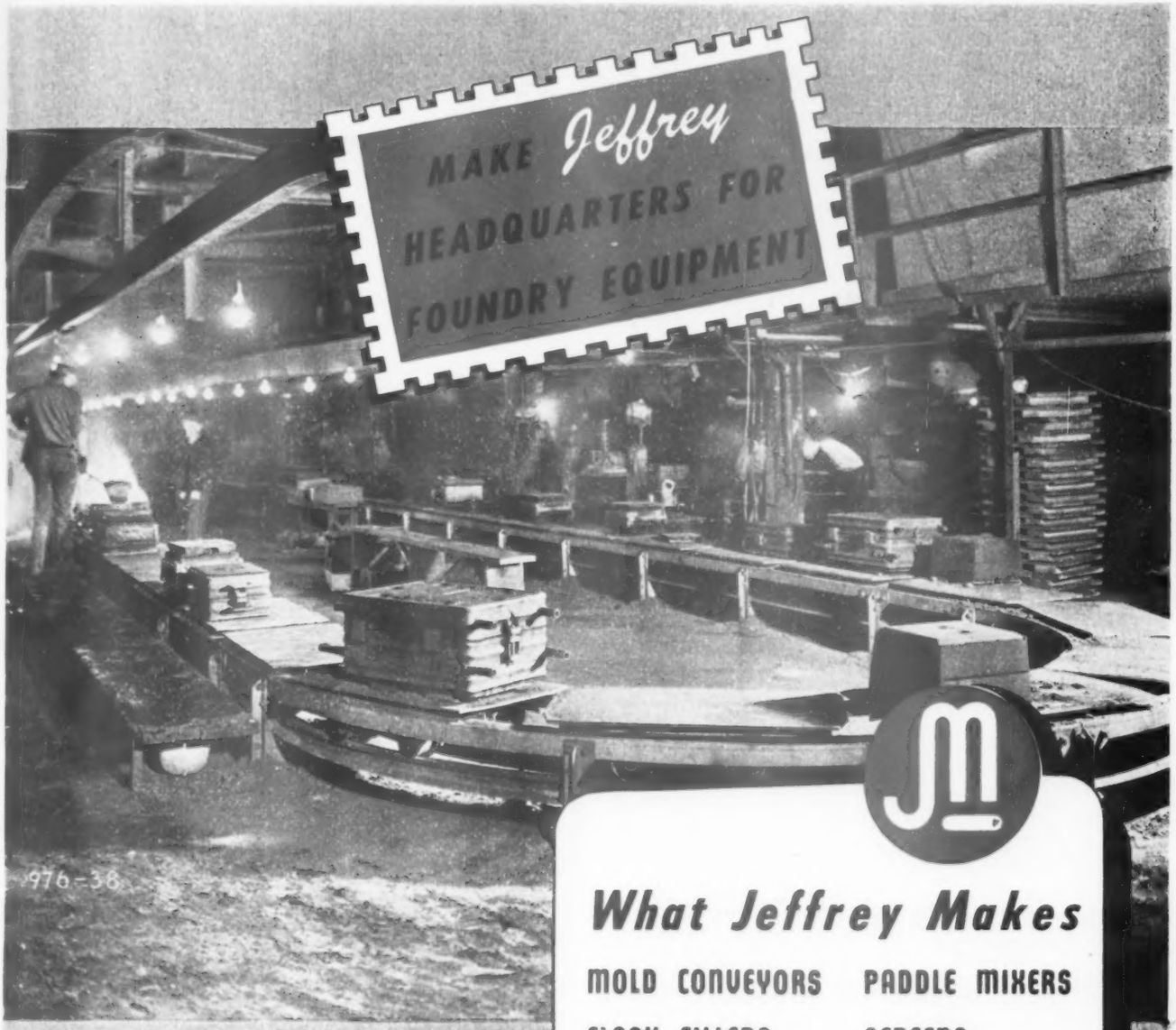
Third (ground) wire per U. S. Govt. code—furnished with No. 9 at no extra cost; $1.20 extra with Nos. 1, 2 and 5 vibrators.

KNEE SWITCHES for operating Red Electric Vibrators:
Single pole $3.60, Double pole $4.80.

FOUNDRY SUPPLIES MANUFACTURING CO.

2221 Orchard Street **Chicago, Illinois**

CABLE ADDRESS: "ROTOPLANE CHICAGO"



A Modern Mold Conveyor Installation Showing Both Molding and Pouring Stations

What Jeffrey Makes

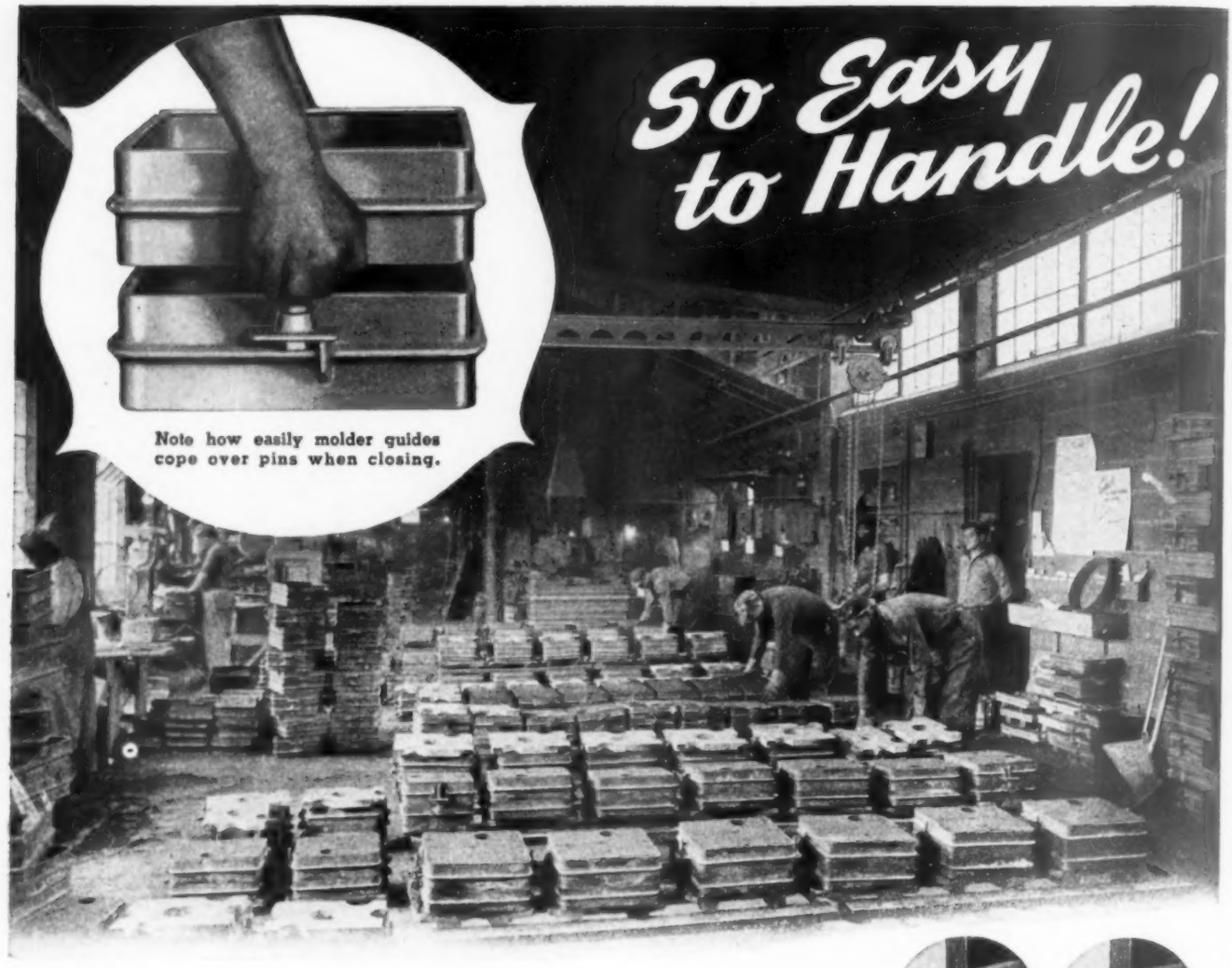
MOLD CONVEYORS
PADDLE MIXERS
FLASK FILLERS
SCREENS
AERATORS
BIN VALVES
SANDITIONERS
CONVEYORS
BUCKET ELEVATORS

THE JEFFREY MANUFACTURING COMPANY

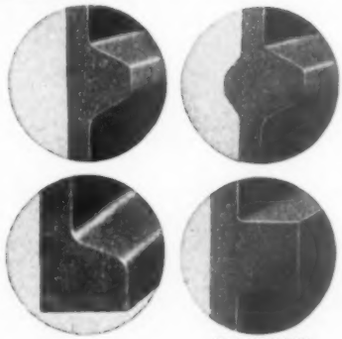
ESTABLISHED 1877

967-99 North Fourth St., Columbus 16, Ohio

Baltimore 1 Buffalo 2 Cleveland 13 Harlan Milwaukee 11 Pittsburgh 22
Birmingham 3 Chicago 1 Denver 2 Houston 5 New York 7 St. Louis 3
Boston 16 Cincinnati 2 Detroit 13 Huntington 19 Philadelphia 2 Salt Lake City 1
Scranton 3



Sterling Steel Flasks are so easy to handle, they save both time and labor. Pin lugs and handles are combined into a sturdy one-piece combination. The molder can feel the pin with his fingers when closing the flask. If desired, hardened steel bushings can be installed to maintain proper pin clearance. And remember, Sterlings solid, all-welded construction assures a long life of dependable service at low cost. That's why Sterlings are the preferred flasks in more than 4000 foundries.



(Pat. 1974292)

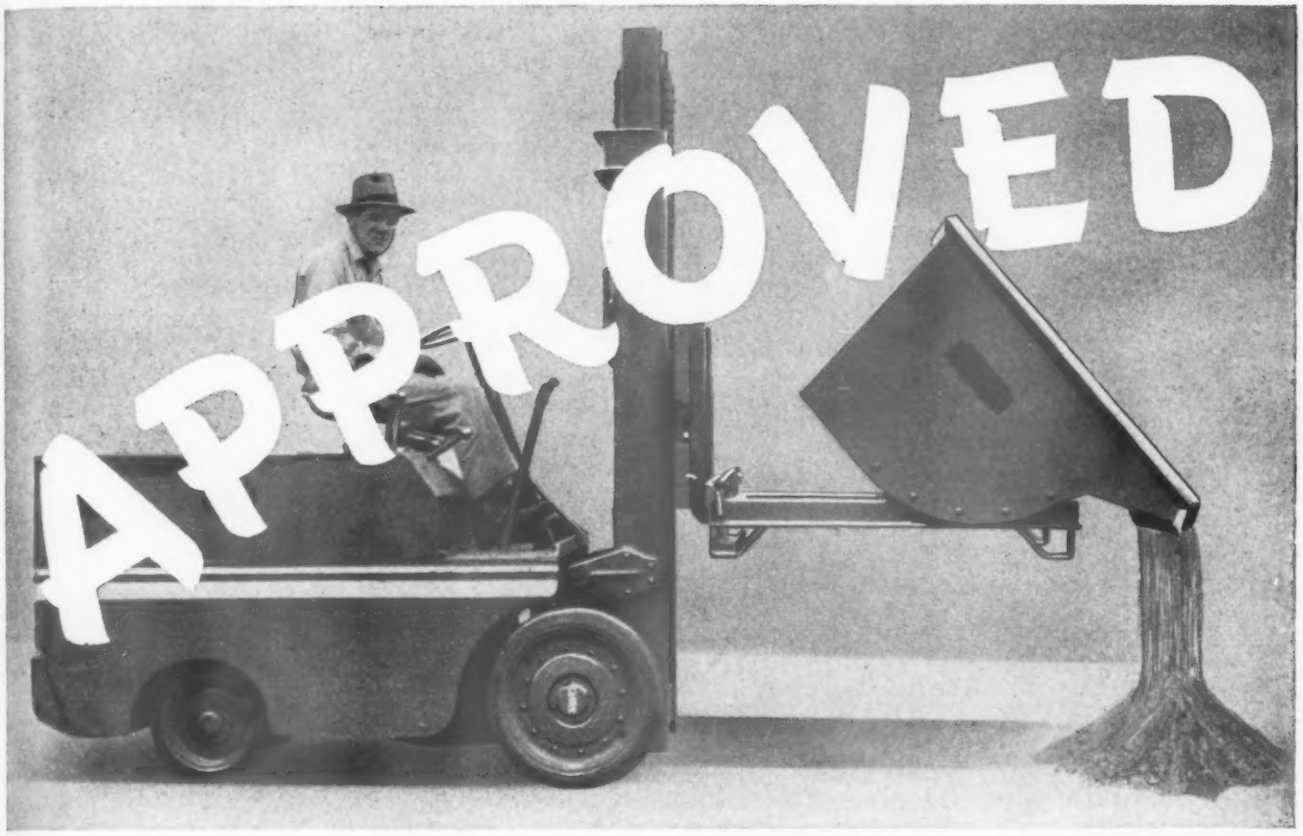
STERLING FEATURES

All welded, integral ribs and flanges; solid center reinforcing rib; square flanges; full-width bearing. Simplifies ramming and shaking out. Speeds up molding.

Sterling FOUNDRY FLASKS

STERLING WHEELBARROW COMPANY • MILWAUKEE 14, WIS., U. S. A.

A 5011-1P



BY USERS EVERYWHERE

ROURA SELF-DUMPING HOPPERS!

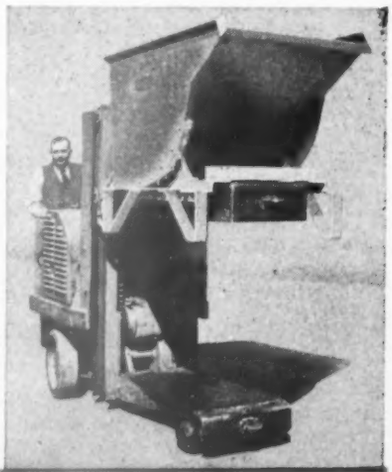
No slow, tiring hand work. Automatically dumps, levels and relocks. Only one simple manual operation.

Because THEY SAVE MONEY by doing every type of bulk handling job you have . . . REDUCE FATIGUE 50% and save time with PERFECT SAFETY—leading industries throughout the country use ROURA Self-Dumping HOPPERS.

Handle any bulk material in your plant . . . hot, cold, wet or dry . . . without slow hand transferring fatigue slow-down, danger of injury from excessive lifting or dropping.

STANDARD (1 cu. yd.) MODEL $100.00 . . . F.O.B. Detroit. 30-day test free. Write for NEW DETAILED BULLETIN today.

Fits any standard fork or platform type lift truck. Sturdily balanced for carrying and dumping.



ROURA IRON WORKS

1405 Woodland Avenue, Detroit 11, Michigan

The 12"-38" Adams Jolt Squeezer, Portable Type

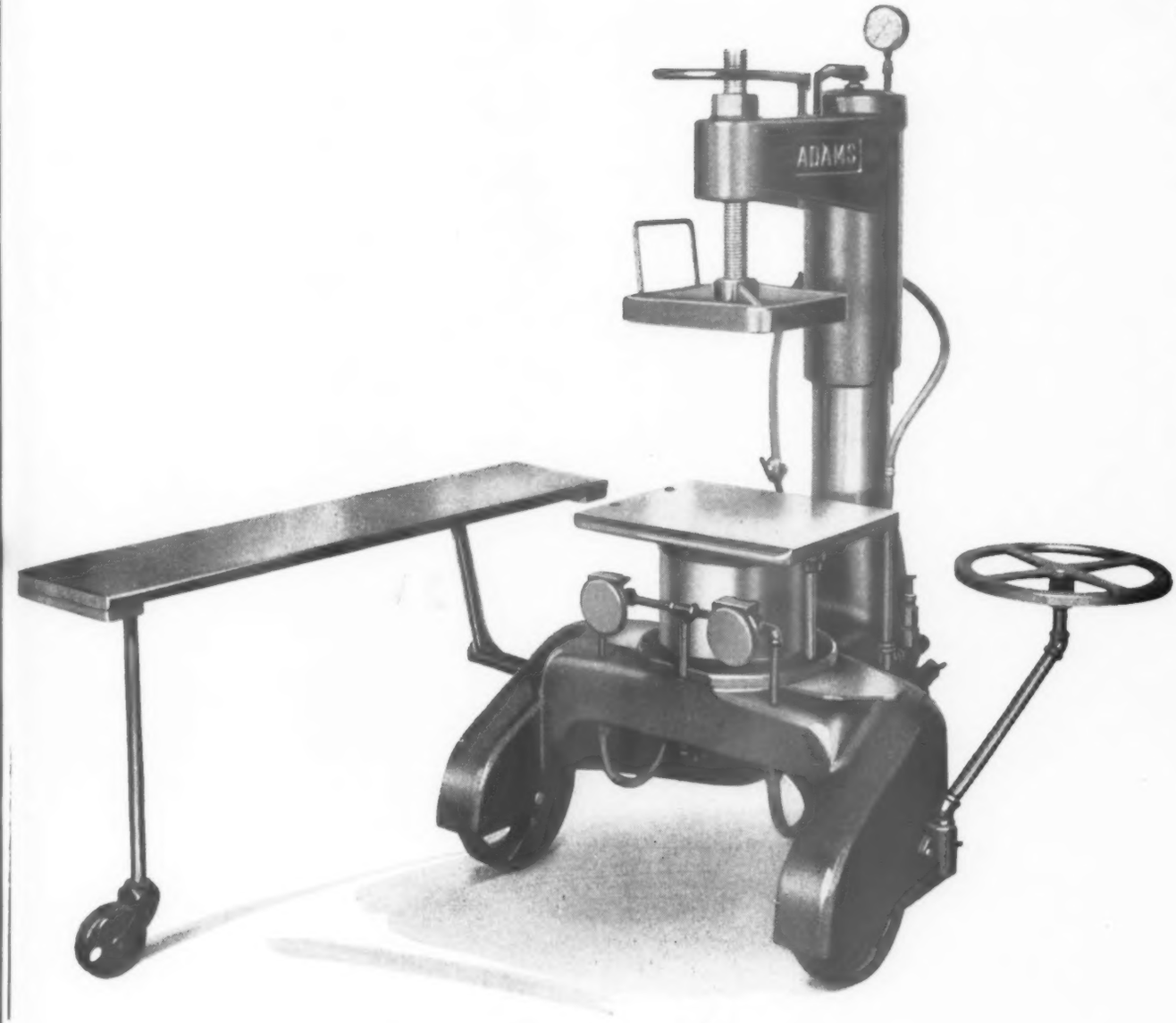
Produce Efficiently...Us

EFFICIENT DESIGN— Simplicity in design has been a characteristic of Adams Molding Machines for the past fifty years. The importance of this factor is expressed in the efficient performance of our current line.

PRECISION MANUFACTURE—The most modern equipment is used in the manufacture of these machines, and unusually close tolerances have been established. All parts are interchangeable.

THE ADAMS COMP

MOLDING MACHINES · FLASK



The 10" Post Type Jolt Squeezer, Portable Type

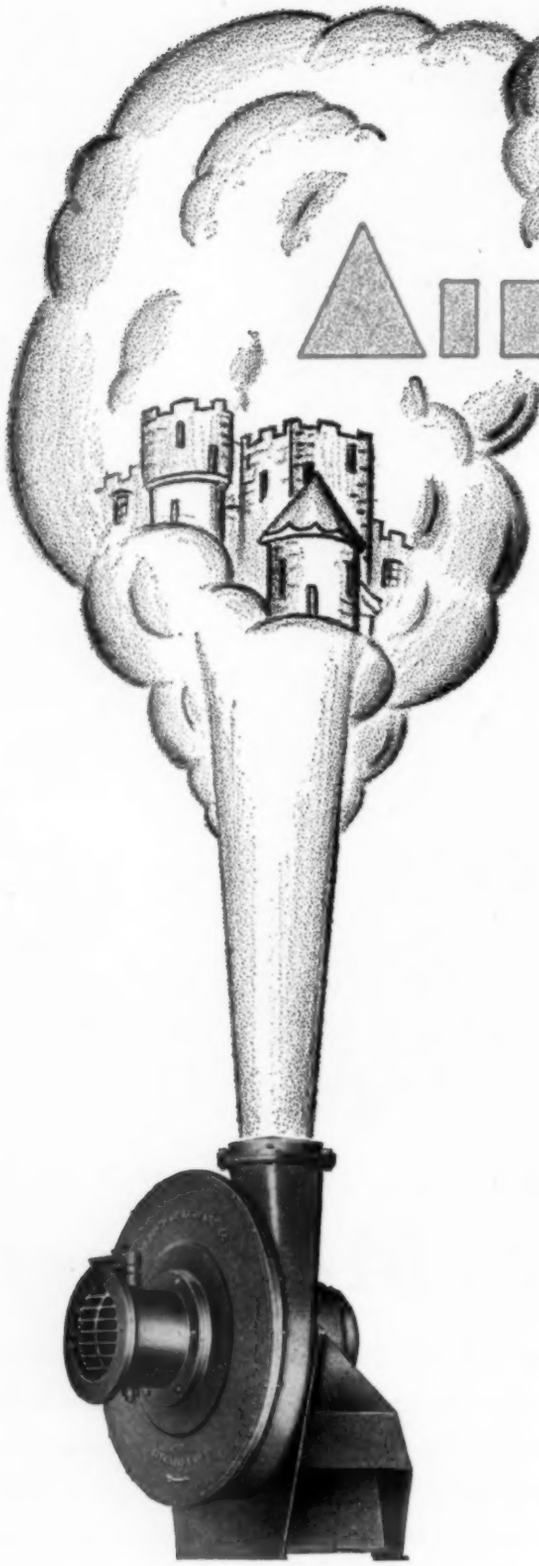
Adams Molding Machines

LESS MAINTENANCE—Careful selection of materials and reduction of moving parts to a minimum makes upkeep negligible. Centralized automatic lubrication and protection against sand and dust assist in reducing wear.

EASY OPERATION— Everything possible has been done to provide convenience for the operator, and this is reflected in increased output. Operating controls are properly located to reduce lost motion.

Y · DUBUQUE, IOWA · U.S.A.

EQUIPMENT *Established 1883*



AIR CASTLES

ARE WITHIN REACH!

SPECIFY

NORTH AMERICAN TURBO BLOWERS

PROTECTIVE CONTROLLED LUBRICATION

EVERY BLOWER TESTED & GUARANTEED for RATINGS AND BALANCE

SIMPLE DISASSEMBLY AND ASSEMBLY

QUIET, VIBRATIONLESS OPERATION

COMPACT, EFFICIENT DESIGN

SINGLE OR MULTISTAGE

RUGGED CASINGS

DIRECT DRIVES,

V-BELT DRIVES,

COUPLING DRIVES

THE NORTH AMERICAN MFG. CO.
CLEVELAND 4, OHIO
GAS OR OIL COMBUSTION EQUIPMENT
BRANCH OFFICES IN PRINCIPAL CITIES

VANCORAM FERRO TITANIUM

FOR SOUNDER RIMMING STEELS

Vigorous but controlled rimming action and uniform contraction of ingots in the molds are the outward signs of good deoxidation practice in producing open steels. Controlled deoxidation, with consistent results from heat to heat, is assured with Vancoram Brand Ferro Titanium.

Ferro Titanium is used in rimming steels where silicon is undesirable. Vancoram Brand Ferro Titanium is held within carefully specified limits of composition to assure uniformity of results by its use, year after year.

Steelmakers use Vancoram Brand Ferro Titanium to obtain consistently sounder ingots with subsequently greater yields in conversion to the final form required. Blowholes occur only where they are intended to be, and piping is held to a minimum.

There are many variable factors in the production of rimming steels. Vancoram Brand Ferro Titanium eliminates some of the more troublesome of these variables.

HIGH CARBON		MEDIUM CARBON	
Titanium	15 to 18%	Titanium	17 to 21%
Carbon	6 to 8%	Carbon	3 to 4.50%
LOW CARBON			
Titanium	20 to 25%	Titanium	38 to 43%
Carbon	0.10% max.	Carbon	0.10% max.
Silicon	4.00% max.	Silicon	4.00% max.
Aluminum	3.50%	Aluminum	8.00% max.

MAKERS OF VANCORAM FERRO ALLOYS AND METALS

All grades of Ferro Titanium are available from stock, crushed to various sizes, as required. We will be glad to show you how you can use Vancoram Ferro Titanium most advantageously in your production.

VANADIUM CORPORATION OF AMERICA

420 LEXINGTON AVENUE, NEW YORK 17, N. Y. • DETROIT • CHICAGO • CLEVELAND • PITTSBURGH

It's Easier and Cheaper
TO MAINTAIN
THIS *cloth-type* DUST COLLECTOR

Only a Few Seconds Needed To Install a Dustube Filter

Detail of shaker channel with hook for supporting Dustube filter bag.

Section of cell plate over dust hopper with lower end of Dustube in position.

As illustrated above a Dustube is installed simply by inserting the bottom in a cell plate above the dust hopper and hanging the top on a hook attached to the shaker channel. Only one man is needed. He works on the clean air side and needs no tools. Shrinkage of cloth does not affect the ease and speed of this operation because there are no close-fitting frames or screens to bind the fabric. The cloth in a Dustube has unusually long life because it is never under tension and has no metal contacts to corrode or abrade it. Only the finest float dust ever reaches the tubes, never the coarse heavy particles. Dustube filters are always visible for quick inspection, and their condition can be determined without any dismantling whatever. To protect against costly maintenance and lengthy down-time that cripples production investigate Dustubes. Ask for Catalog No. 72.

DUSTUBE FILTER Changed in only 4.6 seconds

This was the winning time set by Mr. W. Wilson, Gen. Fdry. Sup't. at Eclipse-Pioneer Division and Mr. R. F. Anderson, Engineer at General Electric Co. in our Dustube filter changing contest at the recent Foundry Show. The average time for the next 10 awards was 5.4 seconds.

American FOUNDRY EQUIPMENT CO.
105 SOUTH BYRKIT ST. MISHAWAKA, IND.

dustube DUST COLLECTORS

it's better iron from HANNA

For more than 75 years, Hanna Furnace has worked to provide foundrymen with better iron for better castings. Hanna Furnace is quality-minded . . . has always been willing to experiment and cooperate in the development of new ideas that lead to *more uniform* and *higher quality* castings . . . has made continuous progress in controlling crystal growth to insure finer grain structure, thus contributing to the *strength* of finished castings.

Whether you use the new 10-pound Hanna Ten ingot or the conventional 40-pound pig, you can be sure of best results with Hanna iron. A Hanna metallurgist will be glad to point out the specific advantages of both forms of Hanna iron. Just write or phone your nearest Hanna office.

THE HANNA FURNACE CORPORATION

BUFFALO • DETROIT • NEW YORK • PHILADELPHIA • BOSTON

MERCHANT PIG IRON DIVISION OF NATIONAL STEEL CORPORATION

Aluminum ALLOY INGOT

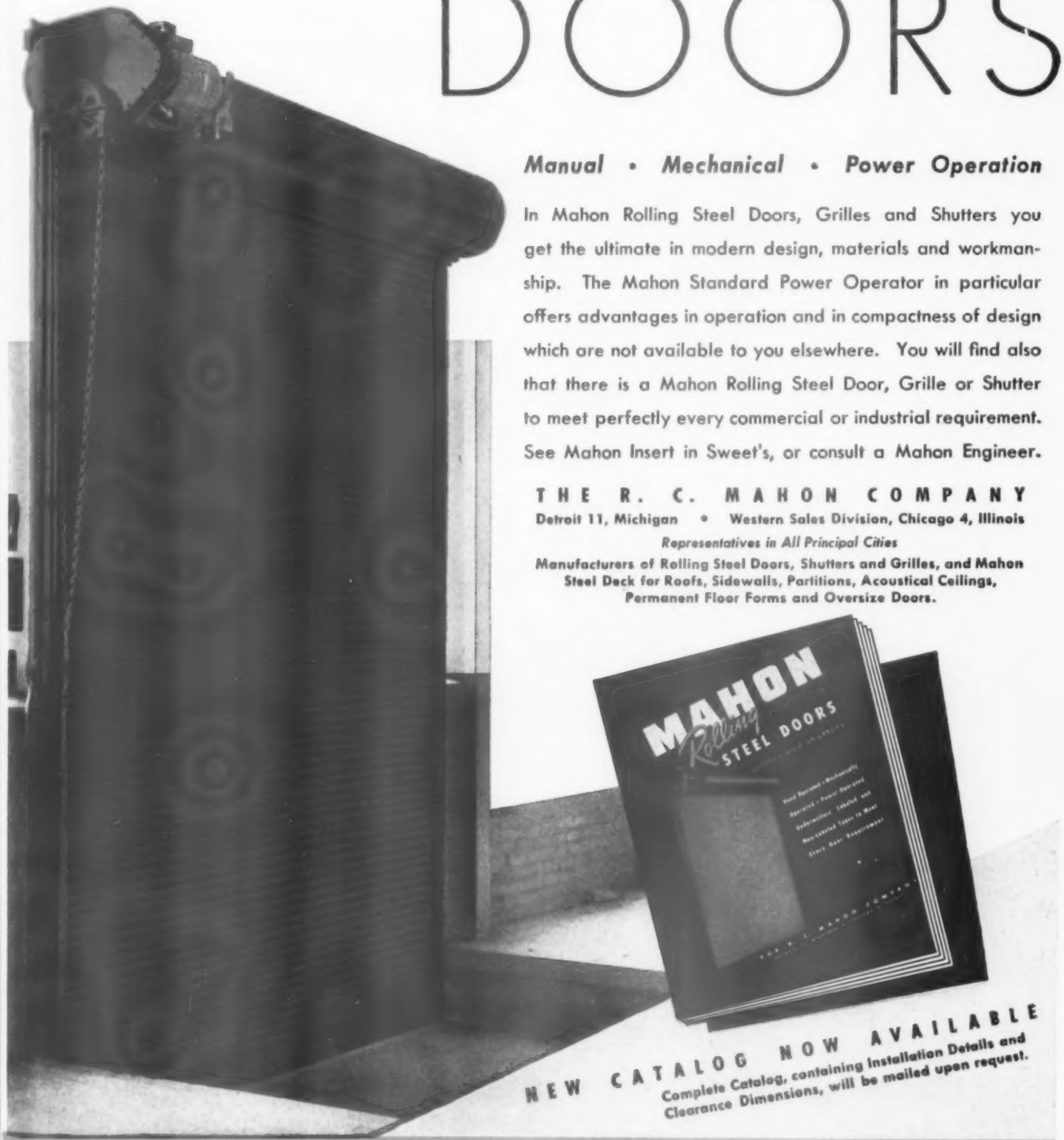
Uniform quality means trouble free production. The men who produce castings—sand, permanent mold or die cast — are the men who realize savings made possible by using S-G Aluminum Alloy Ingot. Every modern testing method is employed by our skilled technicians to insure uniform compliance to specifications. Whatever your needs — Specify S-G Aluminum Alloys.

SONKEN-GALAMBA Corporation

MEMBER ALUMINUM RESEARCH INSTITUTE

Riverview at 2nd Street · Kansas City 18, Kansas

Rolling Steel DOORS



Manual • Mechanical • Power Operation

In Mahon Rolling Steel Doors, Grilles and Shutters you get the ultimate in modern design, materials and workmanship. The Mahon Standard Power Operator in particular offers advantages in operation and in compactness of design which are not available to you elsewhere. You will find also that there is a Mahon Rolling Steel Door, Grille or Shutter to meet perfectly every commercial or industrial requirement. See Mahon Insert in Sweet's, or consult a Mahon Engineer.

THE R. C. MAHON COMPANY

Detroit 11, Michigan • Western Sales Division, Chicago 4, Illinois

Representatives in All Principal Cities

Manufacturers of Rolling Steel Doors, Shutters and Grilles, and Mahon Steel Deck for Roofs, Sidewalls, Partitions, Acoustical Ceilings, Permanent Floor Forms and Oversize Doors.

NEW CATALOG NOW AVAILABLE

Complete Catalog, containing Installation Details and Clearance Dimensions, will be mailed upon request.

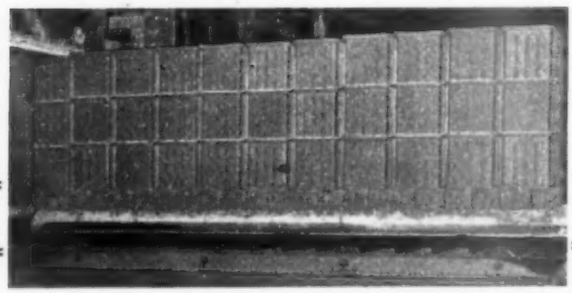
ROLLING STEEL DOORS, SHUTTERS AND GRILLES TO MEET EVERY REQUIREMENT

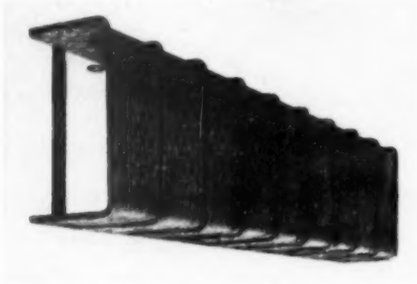
One of Many Mahon Power Operated Rolling Steel Doors Installed in the New Plant of The Falls Spring & Wire Company, Detroit, Mich.

MAHON

PS For Pressed Steel . . . Pioneers in Welded Alloy Equipment

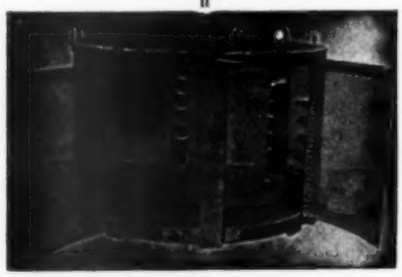
These 22 new P. S. boxes increased furnace capacity by taking up no more room than 18 former cast boxes.





Annealing Rack with a capacity of 10,000 lbs. Cross members are removable.

Carburizing Boxes. Seamless drawn covers and bottoms.



Annealing and Heat Treating Basket 6 ft. in diameter and 6 ft. high with adjustable shelves and sides.

MORE OUTPUT PER HEATING CYCLE

Many foundries have stepped up the output of their annealing furnaces by equipping with P. S. (for Pressed Steel) Lightweight Welded Sheet Alloy Boxes. A typical instance is that of the foundry where the above photograph was taken. This foundry discovered that 22 P. S. boxes required no more furnace space than their 18 former cast boxes. They also found that P. S. boxes heated up quicker and handled faster because of their light gauge, welded sheet alloy construction. Thus their furnace output per heating cycle was materially increased.

Although P. S. lightweight boxes are only one-third the weight of cast boxes, records in many plants indicate their life is much longer than heavier equipment. Consequently, the savings made in increased output and less frequent replacement make their installation a worthwhile investment.

THE PRESSED STEEL COMPANY
of WILKES-BARRE, PENNSYLVANIA

BRANCH OFFICES: 312 Curtis Bldg., Detroit; 503 Nicholas Bldg., Toledo; 1915 Engineers Bldg., Chicago; 51 E. 42nd St., New York; 1005 Sterling Bldg., Houston, Texas; A & M Accessories Ltd., 19 Melinda St., Toronto, Canada; Broad St. Station Bldg., Philadelphia; 417 So. Hill St., Los Angeles.

PRESSED STEEL COMPANY PRODUCTS: Carburizing and Annealing Boxes, Thermocouple Protection Tubes, Seamless Steel Cylinder Caps, Seamless Steel Neck Rings, Welded Alloy Tubing for High Temperature and Corrosive Applications, Radient Tubes, Inner Covers and Base Sheaths for Steel Mills

KRAUSE

Truscor AND Amerikor

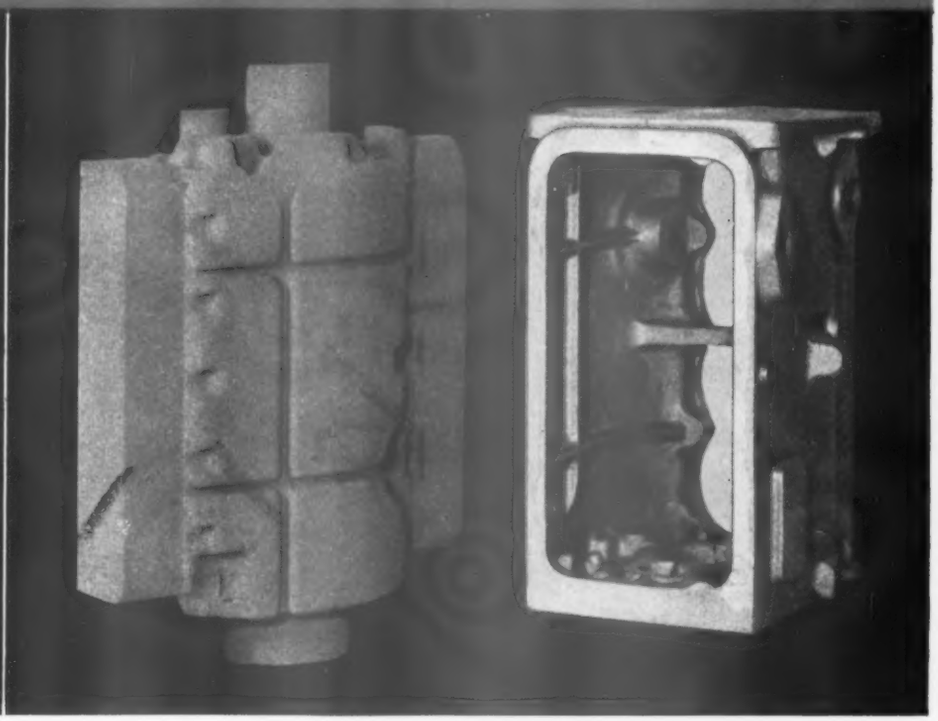
(LIGHT WEIGHT) (HEAVY WEIGHT)

CEREAL BINDERS

Make Cores Collapse Faster

A small percentage added to your mix will:

- Bring out fine detail
- Give smooth performance in core boxes
- Supply proper green bond to sharp sand
- Reduce core and cleaning costs



PARAPHRASING that old saying that "the proof of the pudding is in the eating," the illustration above shows the value of cores made with Krause Cereal Binder. At the left is a half section of a core for a gray iron housing. At the right is the finished casting. Notice the detail . . . the smoothness of surface . . . the elimination of surface finishing.

Made to the most exacting standards, Truscor and Amerikor are of unvarying quality . . . provide greater binding strength in the green and dry core stages . . . have increased permeability . . . stick less . . . ram easier . . . and give you increased production of better cores.

For better cores at lower cost, with fewer rejects, specify Truscor or Amerikor on your next order for cereal binder.

CHAS. A. KRAUSE MILLING CO., Milwaukee 1, Wis. • ***World's Largest Millers of Dry Corn***

'PHONE, WIRE OR WRITE OUTLINING YOUR CORE PROBLEM IN DETAIL.

DISTRIBUTORS

M. A. Bell Co., St. Louis 2, Mo.
A. L. Cavedo & Son, Inc., Richmond 21, Va.
Foundry Supplies Co. Chicago 16, Ill.
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Independent Foundry Supply Co., Los Angeles 11, Calif.
Carl F. Miller & Co., Seattle 4, Wash.
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Miller & Zehrung Chemical Co., Portland 9, Oregon
Milwaukee Chaplet & Mfg. Co., Milwaukee 4, Wis.
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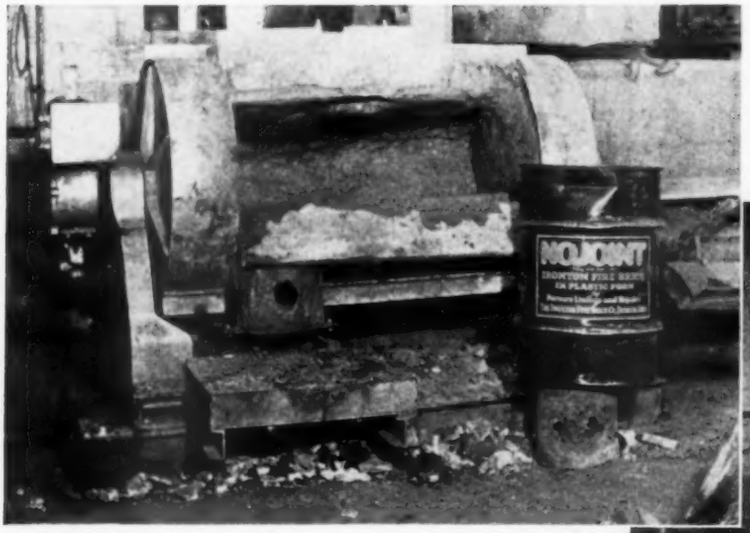
Smith-Sharpe Co., Minneapolis 14, Minn.
Frederic B. Stevens, Inc., Buffalo 12, N. Y.
Frederic B. Stevens, Inc., Cleveland 14, Ohio
Frederic B. Stevens, Inc., Detroit 26, Mich.

"IRONTON NOJOINT" for Foundry Ladles



"Ironton Nojoint", a special type of plastic ramming refractory continues to give extra long service in U-shaped as well as cylindrical-receiving, mixing and desulphurizing ladles. It is easy to install, it is highly resistant to soda slags and there is no possibility of carbon pick up from "Ironton Nojoint" linings.

We offer you the assistance of an engineer in installing the original lining and training your men to do the job.

Ask us for complete information on "Ironton Nojoint".

THE IRONTON FIRE BRICK COMPANY

RELIABLE REFRACTORIES

IRONTON OHIO

REDUCE YOUR REJECTS WITH POSITIVE VENTING

Are your cores positively vented? Sure! you say, the vents are put in when the core is made. But too often, by the time the coring-up floor is reached, a vent has become crushed, or it is discovered that somebody forgot to open one. One clogged vent can cause a blow and a rejected casting.

The way to insure that vents have been properly opened is to put them in *after* the core or mold has been dried. The safest and quickest way to do this is to use the small I-R air-drill. It permits positive control of the venting, the size of the opening and the number and the location of each one. The speed with which it makes a clean hole is amazing.

This same lightweight air drill finds many other uses in the foundry, such as drilling holes for chill nails—digging out hooks—cutting grooves and gutters—assembling cores, etc.

Put these I-R air drills to work on positive venting and put your mind at ease. If once you try this handy air drill, you will find dozens of uses for it.

Ingersoll-Rand

11 BROADWAY, NEW YORK 4, N. Y. 6-631

DRILLS • GRINDERS • CHIPPERS • RIVETERS • WRENCHES • HOISTS

Choosing THE ONE in a Million!

Actually, there are more than a million possible combinations of abrasive, type of bond, grade, grain size, structure, and shape in which a grinding wheel might be made. Seemingly, this vast number presents a terrific problem in the accurate selection of the one wheel best suited for any particular grinding operation. In practice, it is a relatively simple matter.

In the first place, your own experience quickly narrows the field to a relatively few wheels from which the final choice is made. And, it is in making this last decision where more and more top drawer production men depend on the advice and suggestions of an abrasive specialist.

Your CARBORUNDUM representative is always prepared to offer competent assistance in selecting grinding wheels that give better grinding at minimum cost. His thorough analysis of your grinding operations provides a dependable double check on their efficiency. Often, he can offer a practical suggestion for improvement. For he is fully aware of the latest developments in abrasives and their application. What is more, his very business brings him in daily contact with a variety of modern grinding jobs. Where the problem is especially difficult or involved, he can call in one of our Abrasive Engineers. If necessary, the facilities and resources of the world's best known abrasive laboratories are available. You receive cooperation that assures you of getting the most out of your grinding operations and abrasive wheels when you call in CARBORUNDUM.

The Carborundum Company, Niagara Falls, New York.

A good rule for good grinding... **CALL IN**

CARBORUNDUM

TRADE | MARK

BONDED ABRASIVES

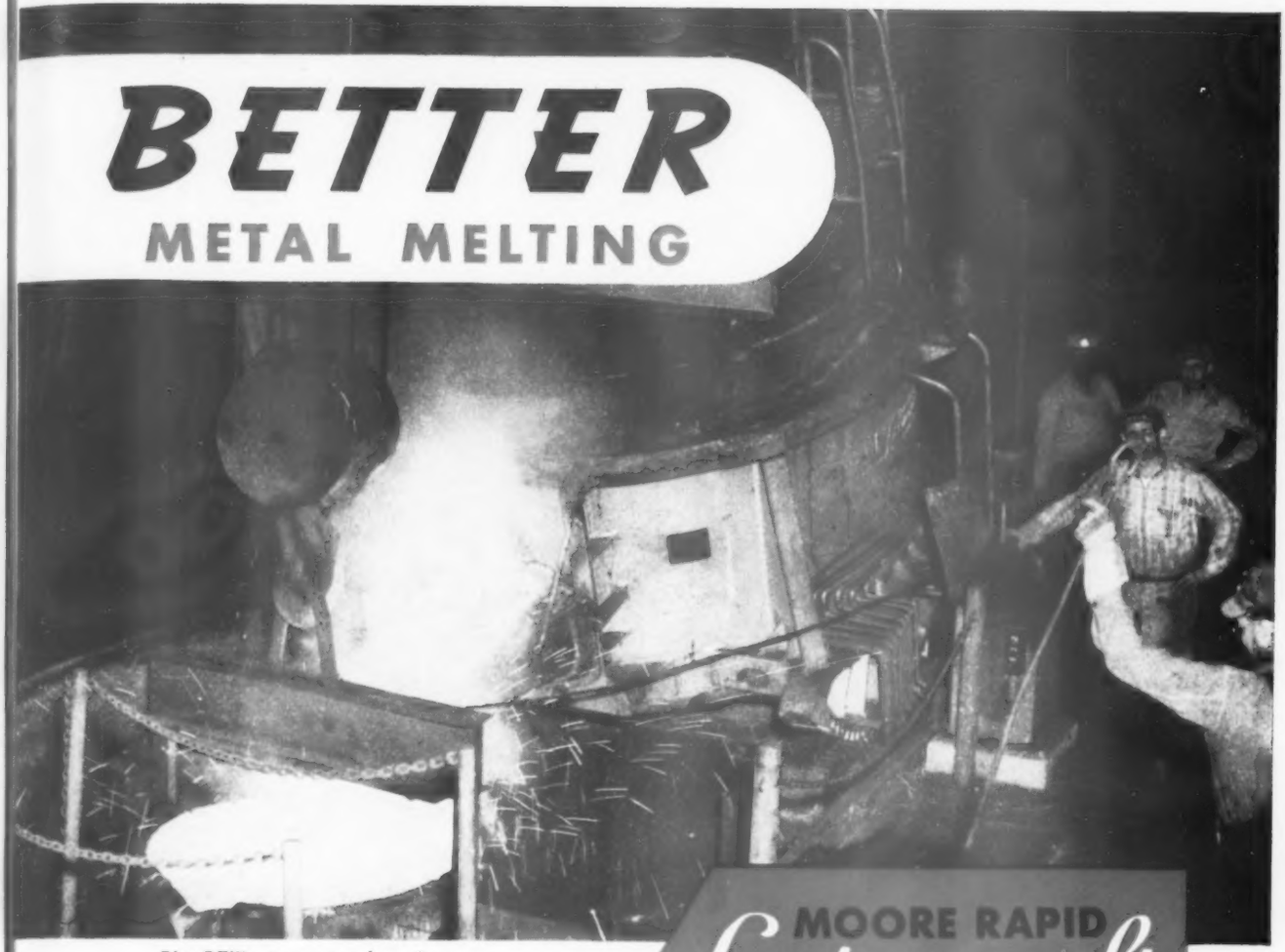
WHEELS
Silicon Carbide
Aluminum Oxide
Diamond
Cylinder Hones
Sticks, Stones & Rubs
Specialties

COATED ABRASIVES
Paper, Cloth and Combination
Sheets, Rolls, Discs

ABRASIVE GRAINS AND COMPOUNDS
for:
Polishing
Lapping
Pressure Blasting
Finishing

"Carborundum" is a registered trademark which indicates manufacture by The Carborundum Company

BETTER METAL MELTING



Size OPT, 4½ ton per hour Lectromelt Furnace tapping a heat.

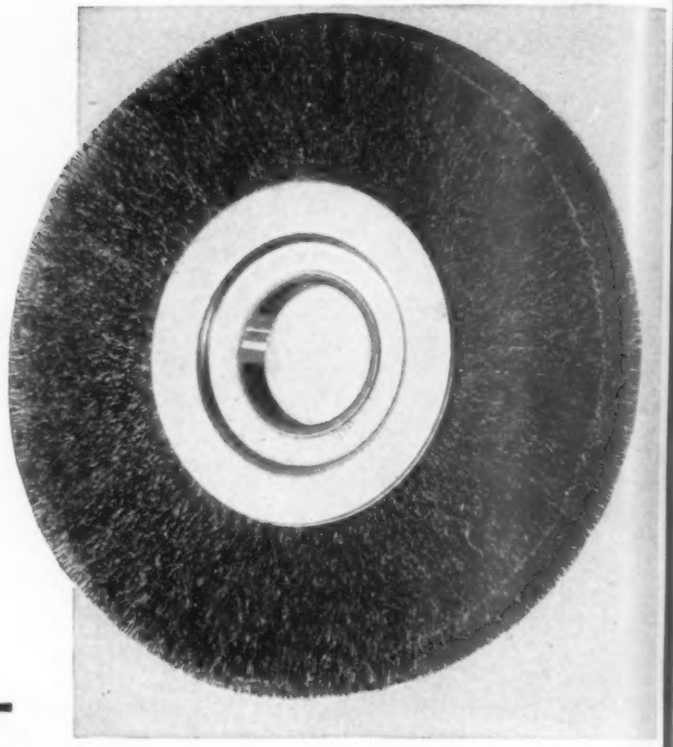
MOORE RAPID Lectromelt FURNACES

Steels melted in Lectromelt Furnaces are of unexcelled quality whether by acid or basic working. Irons are strong, clean, dense and readily machinable. Duplication of any desired composition is exact and sure.

Part of a heat may be tapped and the analysis of the remainder differently alloyed to suit requirements. This makes for economical melting of small quantities to meet diversified orders. Write today for complete information.

Lectromelt Top Charge Furnaces are available in capacities ranging from 100 tons down to 250 pounds.

PITTSBURGH LECTROMELT FURNACE CORPORATION
PITTSBURGH 30, PENNA.



For Super Fast Cleaning and Finishing...

WITH EXTRA

L-O-N-G L-I-F-E

AND ECONOMY

Thor WIRE WHEEL BRUSHES

IMMEDIATE DELIVERY FROM DISTRIBUTORS STOCKS

Firmly anchored to the core by a patented, strength-adding process, the Double-Durable special crimp wire which fills Thor Wire Wheel Brushes has above-average resistance to crystallization and breakage. It holds its strength longer for continued efficiency in cleaning, de-burring, roughing and burnishing. Used on portable or stationary equipment with spindle speeds up to 6000 r.p.m., these Thor brushes do better work with maximum economy.

Made in sizes from 4" to 12" diameter, with wire from 30 to 36 gauge, Thor brushes are available in single-unit, arbor-hole adaptor or metal-center sectional types. A new Thor folder, No. 538, makes selection of the proper brushes for your jobs simple. Write for your FREE copy . . . today.

INDEPENDENT PNEUMATIC TOOL COMPANY

600 W. Jackson Boulevard, Chicago 6, Illinois

Birmingham Boston Buffalo Cleveland Detroit Los Angeles Milwaukee New York Philadelphia
Pittsburgh St. Louis Salt Lake City San Francisco Toronto, Canada London, England

Thor PORTABLE POWER TOOLS

PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS

OWNERS OPERATORS

IMMEDIATE DELIVERY

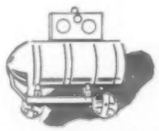
ARC WELDERS...

RELATED EQUIPMENT

New and used arc welders of well known makes, including Hobart, Lincoln and Westinghouse, in 200, 300 and 400 ampere ratings, either AC or DC, are now included in government-owned surplus and are available for immediate purchase and delivery.

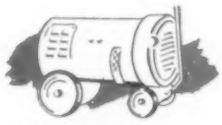
Here you will find the equipment to modernize your shop—to replace worn-out or obsolete welders—to expand your business.

Prices are low, based on the type and condition of the equipment. The inventory is located at various points throughout the country. It is broad and includes the machines you need. To obtain complete information on the availability, location and condition of the equipment you want **fill out the coupon and send it to your nearest War Assets Administration Regional Office.**



Lincoln—In all models and most ratings. Hundreds in the popular 300-400 Ampere size.

Hobart—Standard models of this make available in large quantities and most ratings.



Westinghouse — Portable models available in limited quantities.

Electrodes and Welding Rods — Millions of pounds available in all types and sizes.

EXPORTERS: Most surplus property is available to the export market. Merchandise in short supply is withheld from export, and if such items appear in this advertisement they will be so identified by an asterisk.

All arc welders are subject to priority regulations. VETERANS OF WORLD WAR II are invited to be certified at the War Assets Administration Certifying Office serving their area, and then to purchase the material offered herein.

For full information clip and mail this coupon to:

War Assets Administration:
Please send me complete information on the availability, condition and location of the following types of equipment.

....Hobart Arc Welders	....Westinghouse Arc Welders
....Lincoln Arc Welders	....Electrodes and Welding Rods

Arc Welding Equipment: AC.... DC....
Electric Motor Driven: Volts....Phase....Cycles....
Transformer Type: Volts....Phase....Cycles....

Name.....

Firm.....

Address.....

City.....State.....

WAR ASSETS ADMINISTRATION

GOVERNMENT OWNED SURPLUS

Offices located at: Atlanta • Birmingham • Boston • Charlotte • Chicago • Cincinnati • Cleveland • Dallas • Denver • Detroit • Fort Worth • Helena • Houston • Jacksonville • Kansas City, Mo. • Little Rock • Los Angeles • Louisville • Minneapolis • Nashville • New Orleans • New York • Oklahoma City • Omaha • Philadelphia • Portland, Ore. • Richmond • St. Louis • Salt Lake City • San Antonio • San Francisco • Seattle • Spokane

649-1

ARCADE *Equipment*

FOR HIGH SPEED FOUNDRY WORK

No. 5 Jolt Stripper with Hand Lift

The strip frame has quadruple guides with bronze bushings.

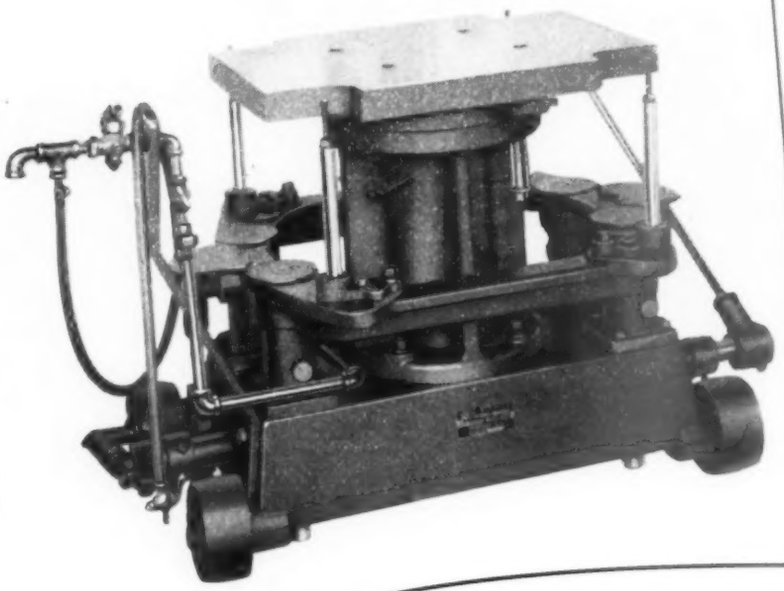
Specifications

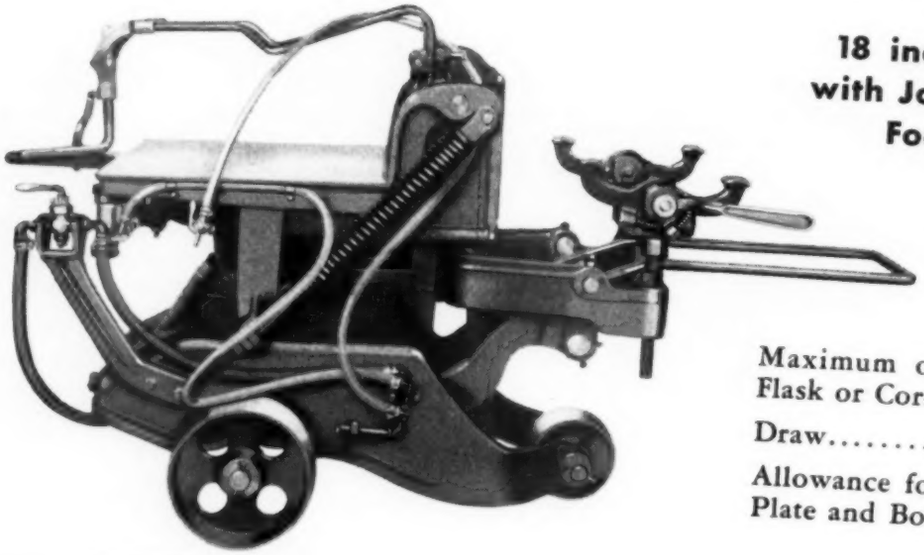
Jolt Cylinder diameter...5″

Table size.....20″ x 24″

Strip.....6″

Lift Pin Centers.....
.....Adjustable





18 inch Rollover with Jolt Hand Roll Foot Draw

Specifications

Jolt Cylinder... diameter.....4″

Table Size..... .....18″ x 18″

Maximum outside width of Flask or Core Box.....18″

Draw.....8″

Allowance for depth of Flask Plate and Bottom Board 12¼″

DEPENDABLE FOUNDRY EQUIPMENT SINCE 1885

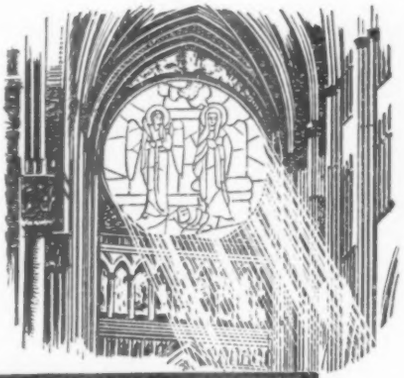
ROCKWELL ARCADE

ARCADE MANUFACTURING DIVISION

ROCKWELL MANUFACTURING COMPANY

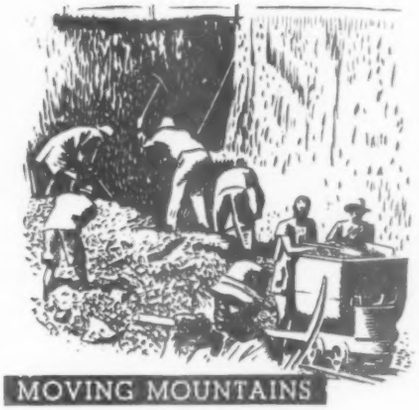
FREEPORT, ILLINOIS

THE STORY OF MANGANESE



12th CENTURY BEAUTY

1 Manganese minerals were known in ancient times and were used to produce the rich colors of medieval stained glass windows. However, it was not until 1774 that the metal manganese was isolated. It became important to steelmakers in 1856 when Sir Robert Mushet used it to perfect the bessemer process.



MOVING MOUNTAINS

2 Mountains of manganese ore from such far-off places as Africa, Russia, India, and Brazil are shipped each year to the United States to meet our nation's requirements. In Electromet's furnaces, these ores are reduced to ferromanganese, silicomanganese, and other alloys of high purity.

TAMING THE BREW

3 Manganese is the most important alloy used in steelmaking. It has a powerful attraction for oxygen and sulphur—gathering and removing these impurities as a slag during the deoxidizing process. One of the best of all deoxidizers is silicomanganese—a combination alloy of silicon and manganese.

SQUEEZE PLAY

4 By combining with sulphur, manganese removes the principal cause of hot-shortness—thereby giving steel better rolling and forging properties. It imparts great strength and toughness, and that's why all steels—castings, forgings, and rolled products—contain at least small amounts of this metal.

PUTTING MUSCLE IN STEEL

5 Manganese makes steel tough. Steel containing about 13 per cent manganese is "work-hardening," that is, it possesses the property of increasing in hardness as the metal is worked. Steam shovel teeth, crushing machinery, and railroad switch frogs would quickly wear out, were it not for this property.

Aid To Steelmakers

Electromet's staff of experienced and well trained metallurgical engineers are always ready to assist you with the proper use of ferro-alloys, and help you solve other metallurgical problems relating to melting procedures. These men are familiar with the most efficient and up-to-date shop practices. Their specialized knowledge has assisted customers in solving many metallurgical problems. For further information write for our booklet "Electromet Ferro-Alloys and Metals."

ELECTRO METALLURGICAL COMPANY
Unit of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.

ELECTROMET Ferro-Alloys and Metals are sold by Electro Metallurgical Sales Corporation, and Electro Metallurgical Company of Canada, Limited, Welland, Ontario.

Electromet
TRADE-MARK
Ferro-Alloys & Metals

DILL, Inc.
RUSHVILLE, INDIANA.

... GOES ALL OUT FOR DIAMOND

Originators of

SNAP FLASKS

HERE in their new modern daylight foundry they find Diamond Flask Molding Equipment giving them uninterrupted production of fine gray iron castings.

This is typical of a host of other foundries using Diamond Flask Equipment for the past 57 years.

DIAMOND

Telephone 2553 — CLAMP AND FLASK COMPANY — Richmond, Indiana

Designers of CORE PLATES, JACKETS, BANDS, FLASKS since 1889

The New, Perfected FISHER IRON POT FURNACE for WHITE METALS

Illustration: Fisher Gas-Fired Iron Pot Furnace. Automatic Temp. control. Hood optional. Capacity:—aluminum, 500 lbs.; tin, 1300 lbs.; lead, 2000 lbs.; zinc, 1250 lbs. Wide range of sizes available.

Progressive plants have studied the peacetime metal products market and found—*the greatest demand ever known!* To help meet that market, they've wisely installed modern, efficient FISHER furnaces.

Foundries, metallurgists and engineers have all contributed their valuable "know-how" to the development and perfection of this versatile furnace.

And the Fisher IP furnace is versatile. Available for either gas or oil firing. It can be installed in almost any area without objectionable heat exposure to personnel. Low maintenance cost and high production output is assured by Fisher's rugged construction—*Fisher-designed* and produced refractories—correct combustion control. Supervision is drastically reduced by use of automatic heat control.

In every way it will pay you to investigate "Fishers" for sand, permanent mold, and die-casting . . . and tinning, soldering, galvanizing or refining. Bottom pouring IP furnaces available for special purposes.

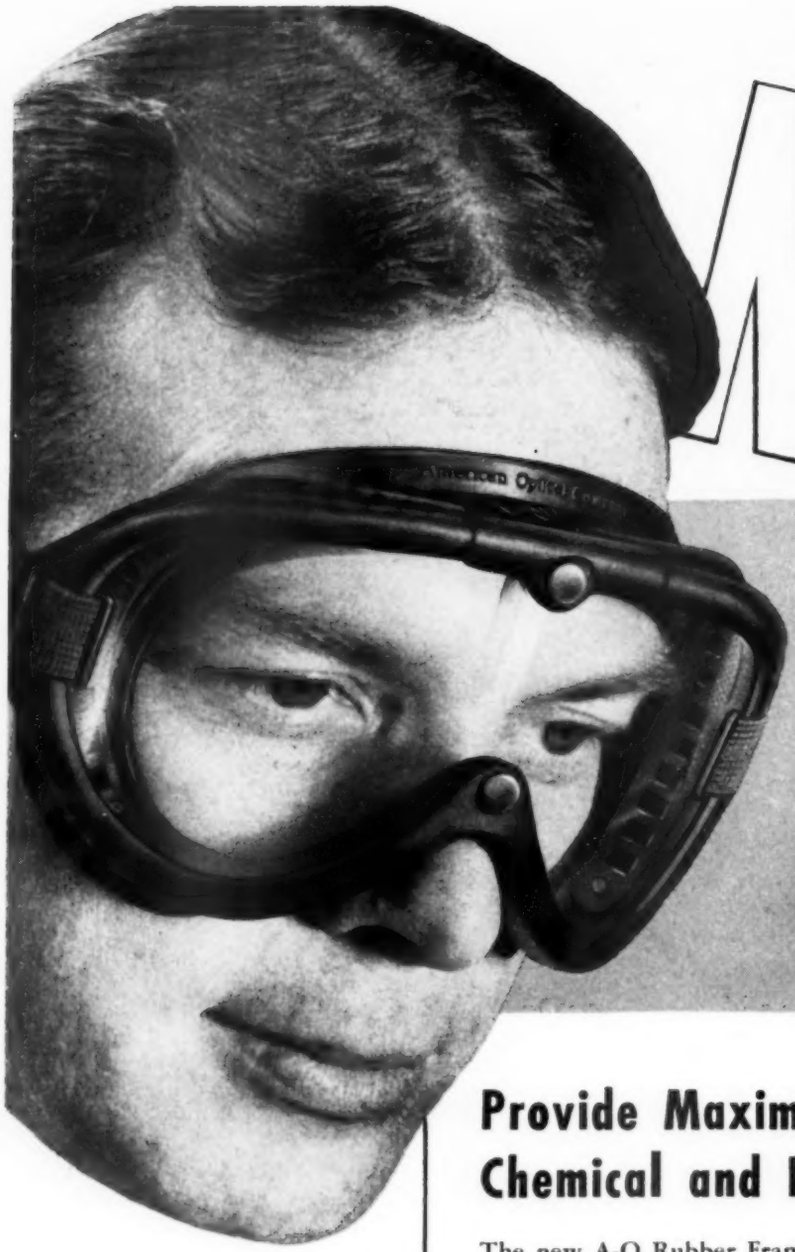
See Fisher also for the best in a wide range of crucible and open flame furnaces—stationary, rotary and tilting—for brass, bronze, aluminum and magnesium.

New Bulletin 101A gives complete details of this remarkable furnace, which performs amazingly on so many different jobs. Write for your copy today.

5519 N. Wolcott Avenue, Chicago 40, Illinois

Fisher FURNACE COMPANY

Engineers and Manufacturers



NEW

A-O RUBBER FRAME GOGGLES

A-O Safety Goggles Safeguard the Eyes of Industry

Provide Maximum Protection Against Chemical and Dust Hazards . . .

The new A-O Rubber Frame Goggle has a single large acetate lens, which provides exceptional wide-angle vision. Frame is molded from non-irritating, acid-resisting synthetic rubber, which will stand up under long, hard wear. It is scientifically designed to conform to face contours, providing an acid- and dust-tight fit. Cushioned and ventilated for maximum comfort. Especially recommended for maintenance men on acid lines and storage batteries; for workers on metal plating baths, foundry shake-out, railroad car and coal handling apparatus cleaning, and in ship holds and engine cabs where dust is a dangerous factor. Send for bulletin which fully describes the various outstanding features of this new A-O development.

American Optical COMPANY *Safety Division*

SOUTHBRIDGE, MASSACHUSETTS
BRANCHES IN PRINCIPAL INDUSTRIAL CITIES

With other metals in short supply, THE SPECIAL ADVANTAGES OF ALUMINUM ALLOYS FOR CASTING PURPOSES ARE MULTIPLIED.

Products designed to use Aluminum Alloy Castings now enjoy a most favorable position, because they are not hampered by material shortages or burdened by excessive costs.

To get the full benefit of the quality, low cost, light weight, and sales appeal of products using Aluminum Alloy Castings—to be assured of Ingot that's uniform, laboratory-controlled, and completely dependable—to have the advice of experts on casting problems available without charge—consult any member.

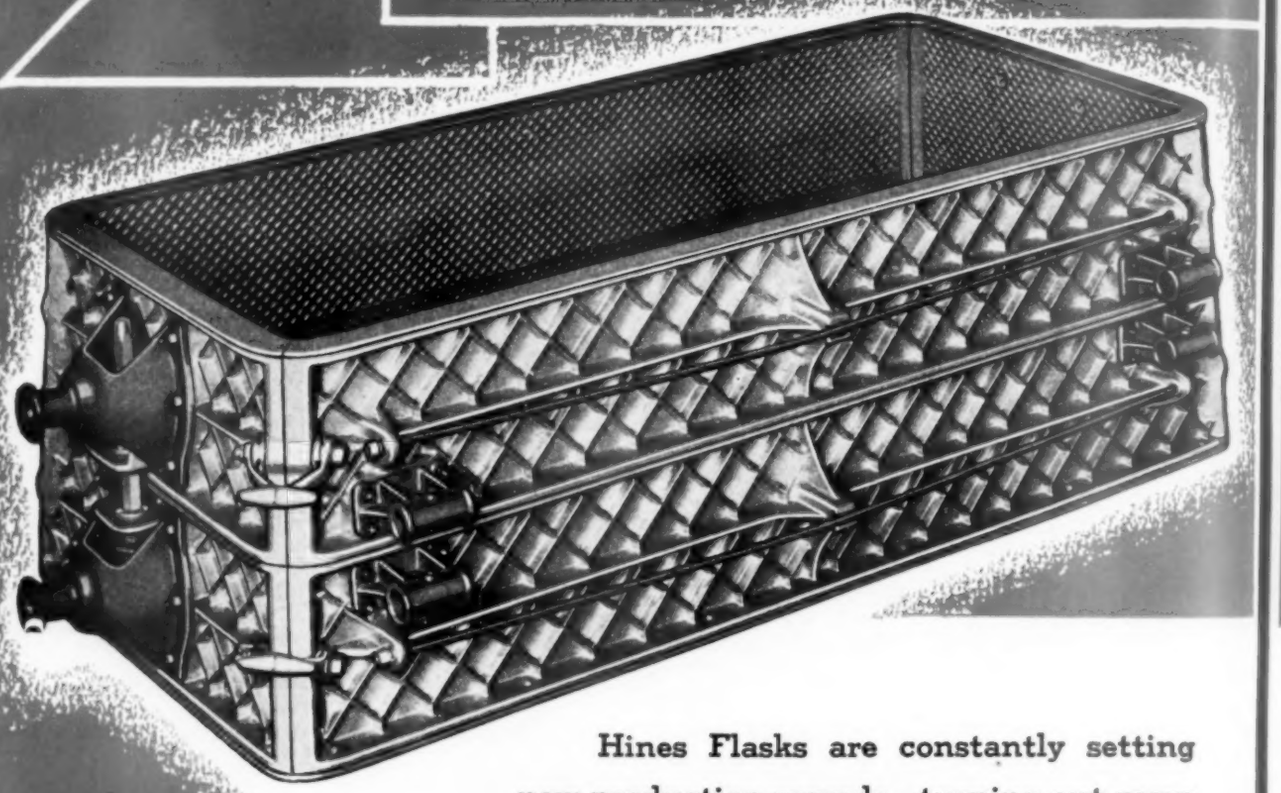
Aluminum Research Institute

111 West Washington Street, Chicago 2, Illinois

MEMBER · ALUMINUM RESEARCH INSTITUTE

The National Smelting Co. *Cleveland 5, Ohio*	Aluminum and Magnesium, Inc. *Sandusky, Ohio*	Federated Metals Division American Smelting & Refining Company *New York City 5 and Branches*
Niagara Falls Smelting & Refining Corp. *Buffalo 17, New York*	The American Metal Co., Ltd. *New York City 6*	General Smelting Company *Philadelphia 34, Pennsylvania*
North American Smelting Co. *Tioga and Edgmont Sts. Philadelphia 34, Pa.*	Apex Smelting Co. *Chicago 12, Illinois*	Samuel Greenfield Co., Inc. *Buffalo 12, New York*
Sonken-Galamba Corporation *Kansas City 18, Kansas*	Berg Metals Corporation *Los Angeles 11, California*	William F. Jobbins, Inc. *Aurora, Illinois*
U. S. Reduction Co. *East Chicago, Indiana*	The Cleveland Electro Metals Co. *Cleveland 13, Ohio*	R. Lavin & Sons, Inc. *Chicago 23, Illinois*

Save and HINES FLASKS



Hines Flasks are constantly setting new production records—turning out more molds per day with less scrap. Production schedules are easily met when Hines Flask Equipment is used.

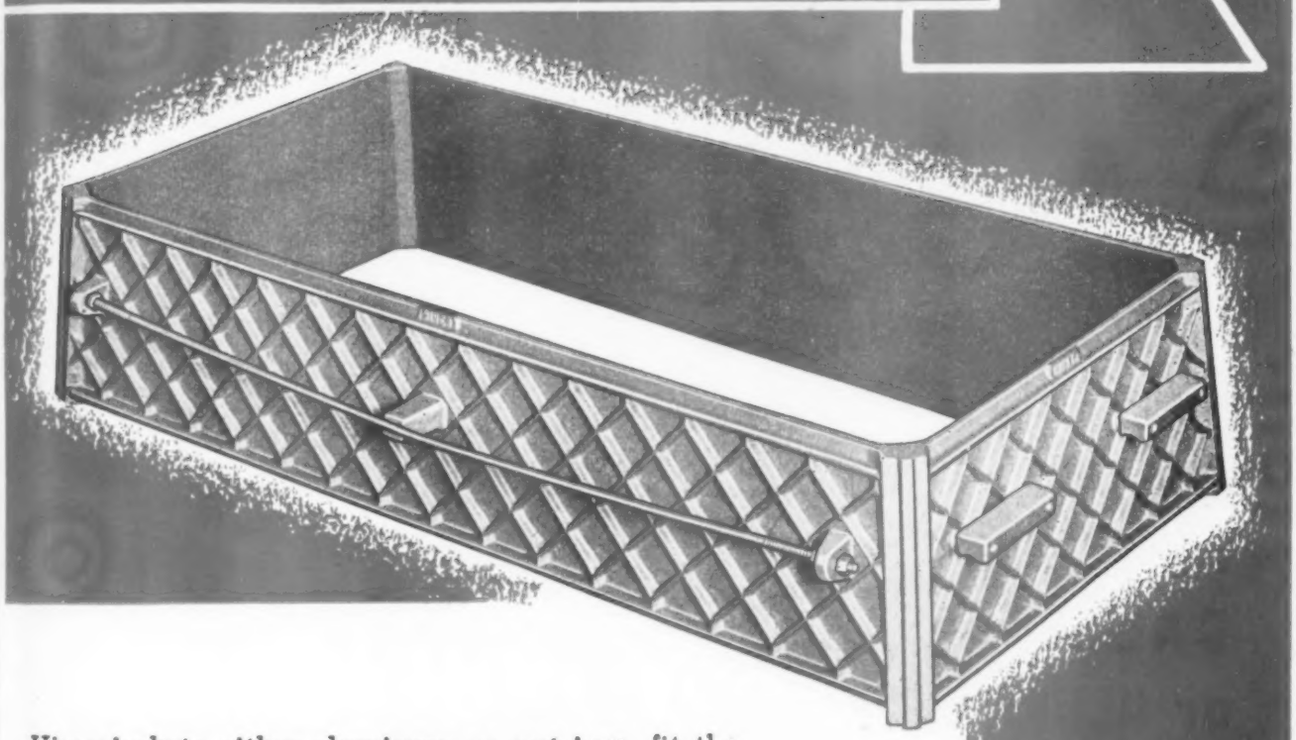
HINES POP-OFF FLASK
(Trademark Reg. U. S. Pat. Off.)

All Hines Flasks and Jackets are fully protected by U. S. and foreign patents and patents pend

THE HINES F

3431 WEST 140th ST.

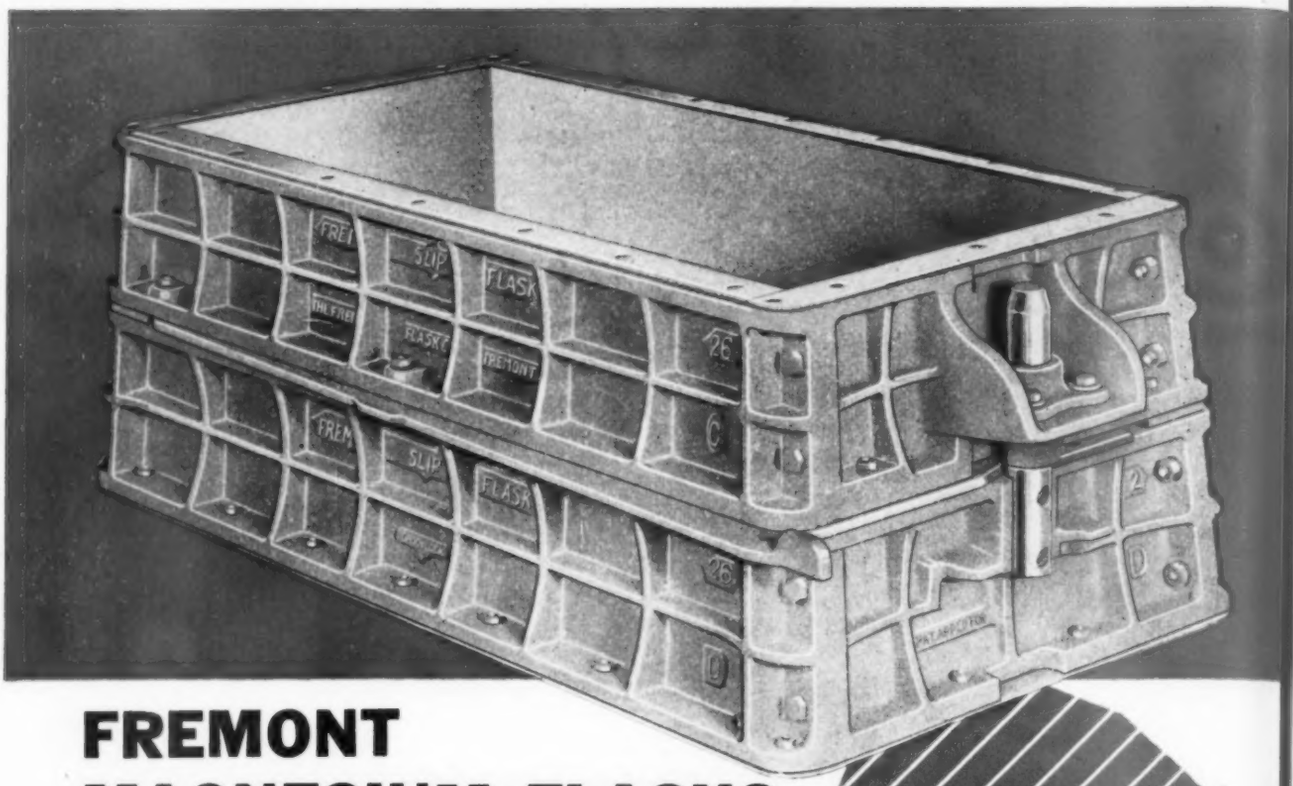
be Safe WITH AND JACKETS!



Hines jackets, either aluminum or cast iron, fit the molds perfectly when used in connection with Hines flasks. Right now, aluminum jackets are more popular than iron. They cost less and the deliveries are much better, due to recent Government Pig Iron Regulations.

FLASK CO.

CLEVELAND 11, OHIO



FREMONT MAGNESIUM FLASKS

JACKETS furnished in CAST IRON or ALUMINUM

•

BUILT FOR LONG SERVICE AND FAST PRODUCTION

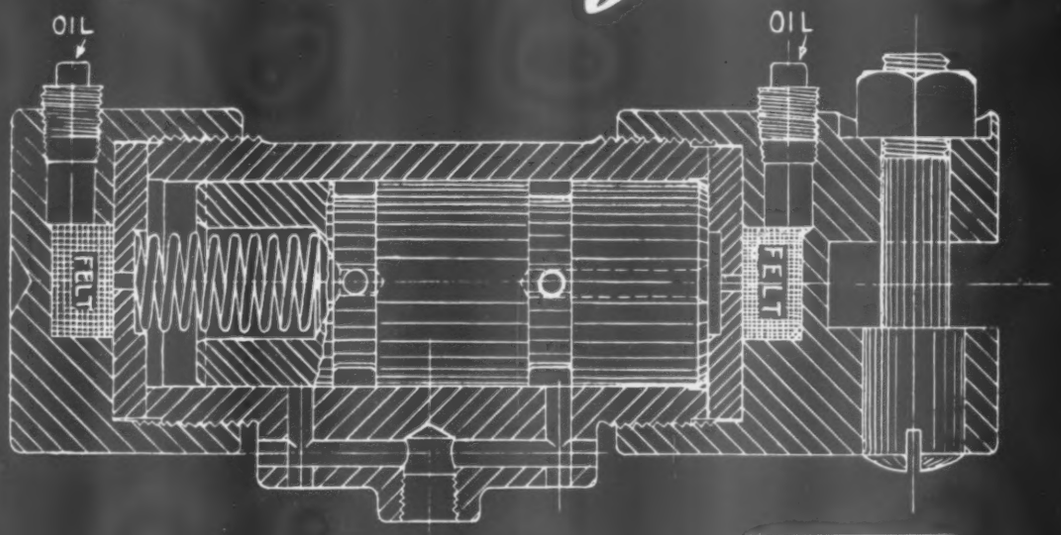
GROOVLOCK

THE FOOL-PROOF PIN

The FREMONT FLASK CO.

FREMONT, OHIO

Unequalled Performance!



TABOR
TRADE 1884 MARK

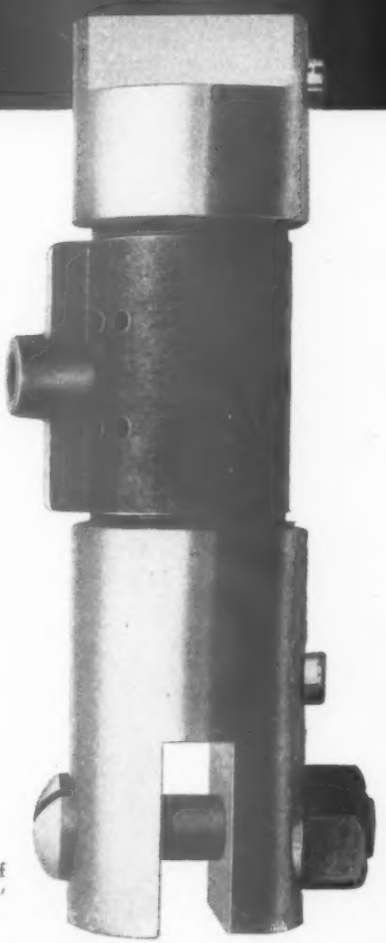
PNEUMATIC VIBRATORS

. . . For Molding Machine and Bench

They have what it takes!

Prove it against any other Vibrators you are using.

Not confined to use on Tabor Machines.



★ Made in piston diameters of ⅝", ¾", 1", 1⅛", 1½" and 2"

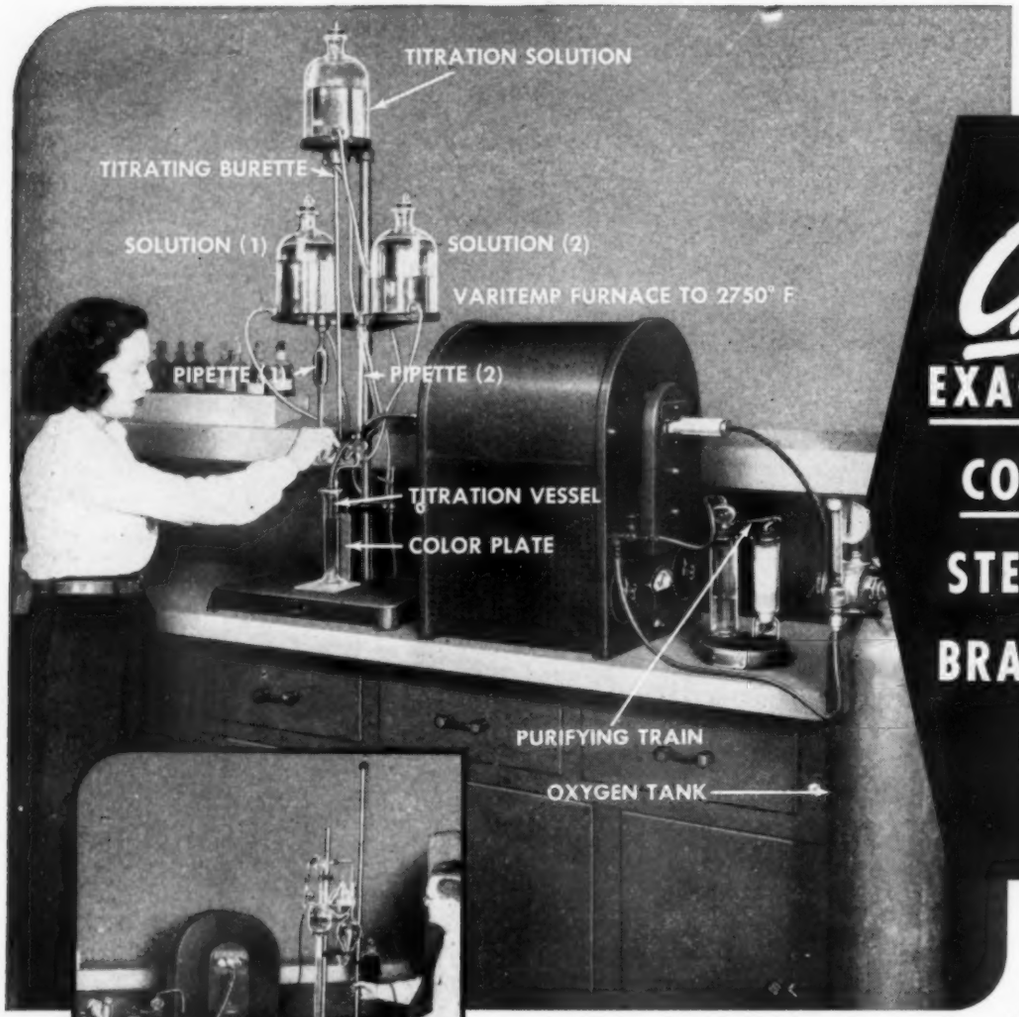
Immediately available from stock

Since 1884 . . . MANUFACTURERS OF FOUNDRY MOLDING MACHINES

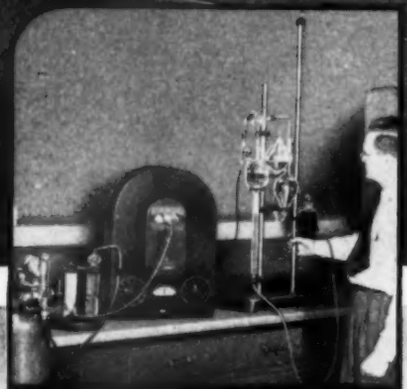
THE TABOR MANUFACTURING CO.

6225 Tacony Street • Philadelphia 35 • Pennsylvania

Representatives: Snyder Foundry Supply Company, Los Angeles, Calif.; Gallagher Foundry Supply Company, San Francisco and Oakland, Calif.; Carl F. Miller and Company, Seattle, Wash.



Check EXACT SULFUR CONTENT of STEEL, IRON, BRASS, COAL, COKE



Carbon Determinator accurate to 1/5 of one point. Test period 2 minutes.

Moisture teller gives exact moisture content of sample in 1 minute and requires no skill in handling.

The Dietert Detroit Sulfur Determinator provides accuracy equivalent to gravimetric determination but very much faster (in just 2 minutes) and easier. It is equally applicable to either alkaline or iodate methods, meets procedure standards as recommended to the ASTM, and you can buy it for less money than any other comparable apparatus. Just check this up for your own information.

With this sturdy compact unit you have just one titration solution that must be carefully prepared and it contains only one chemical.

Note the large solution bottles and the titration vessel which is easy to clean and economical to replace if accidently broken.

ASK FOR INFORMATION ON OTHER DIETERT DETROIT TEST EQUIPMENT

Harry W. Dietert Company

DIETERT EQUIPMENT

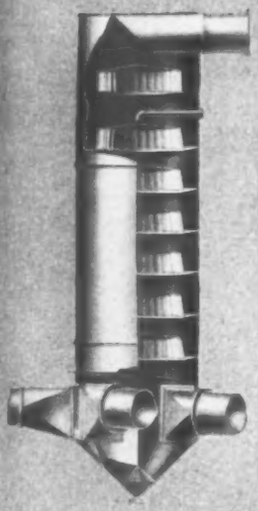
9324 ROSELAWN AVE. • DETROIT 4, MICHIGAN

ANOTHER *Schneible* WET-METHOD *Dust Control* DIVIDEND!

Service as many machines or operations as you wish—

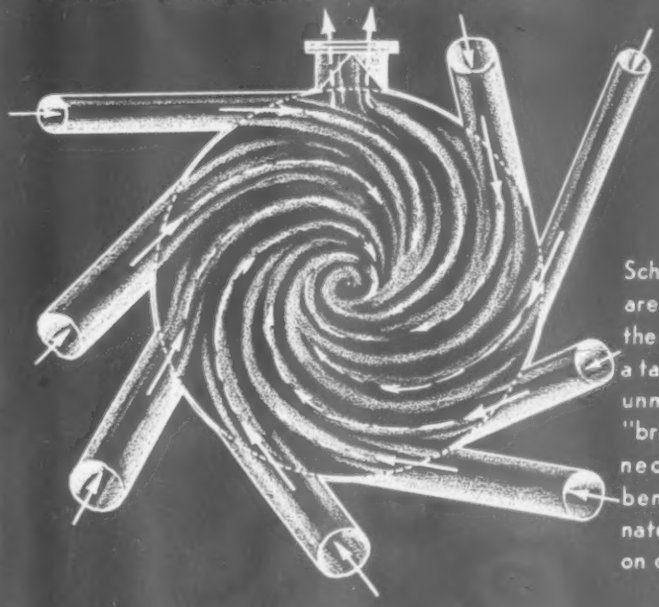
- Shakeouts
- Grinder lines
- Core machines
- Sand conditioning

with direct piping to a single Schneible Dust and Fume Collector.



Schneible Multi-Wash Collector Unit with three intake ducts introduced from different directions.

INSTEAD OF ONE DUST INTAKE DUCT WITH BRANCHES AND BENDS . . .



Schneible-engineered ducts are joined to the base of the dust collector always at a tangent—sharp bends are unnecessary. Numerous "branch-offs" are also unnecessary. Eliminating bends and elbows eliminates costly abrasive wear on ducts.

. . . AS MANY DUCTS AS YOU WISH, FROM AS MANY SHOP OPERATIONS AS YOU WISH, MAY BE INTRODUCED INTO A SINGLE SCHNEIBLE DUST COLLECTOR

As many ducts as desirable can be connected to the outer periphery of the collector of a Schneible Multi-Wash Collector. Their efficient operation *does not depend* on contaminated air entering the collector through a single intake.

You can install a Schneible anywhere you wish and still make any and all duct connections to it!

Unlimited direct duct connections without tie-in tees and elbows between your operations and the Schneible Dust and Fume Collector virtually abolish duct wear and reduce back pressure. Schneible ductwork goes directly from the dust-creating operation to the collector—no curlicues—less ductwork required.

Schneible-engineered ductwork is just one more reason why so many foundries have considered Schneible Multi-Wash Dust and Fume Collectors standard for nearly a quarter of a century.

Engineering Representatives in Principal Industrial Centers

CLAUDE B. SCHNEIBLE CO., 2827 Twenty-fifth St., Detroit

SCHNEIBLE

IT TAKES MORE THAN GOOD METALS

TO MAKE *Sipi Quality* .....

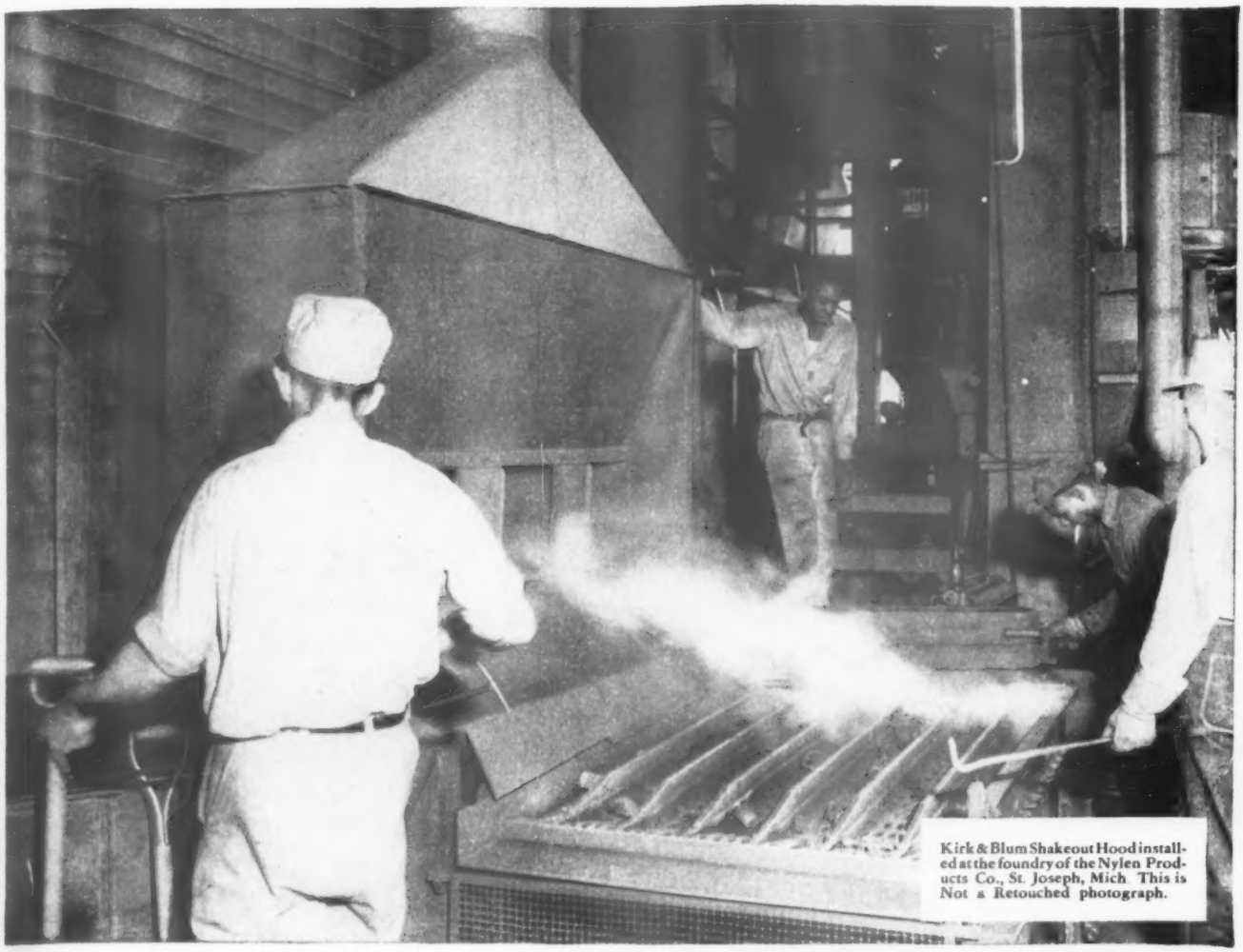
Above all, it requires the determination to make only the best. Then . . . it takes knowledge . . . years of experience in actually producing alloys of the highest quality. Finally, it calls for research—continuous and unhampered—by men provided with modern equipment and skilled in both laboratory and plant technique. These . . . plus selected materials . . . are priceless ingredients of SIPI Alloys.

Silverstein and Pinsof

INCORPORATED

1720 ELSTON AVENUE CHICAGO 22, ILLINOIS

BRASS • BRONZE • ALUMINUM • LEAD • TIN • SOLDER • TYPE METALS • BABBITT • ZINC BASE ALLOYS



Kirk & Blum Shakeout Hood installed at the foundry of the Nylen Products Co., St. Joseph, Mich. This is Not a Retouched photograph.

KIRK & BLUM AIR ENGINEERING

. . . provides effective Ventilation of Shakeout

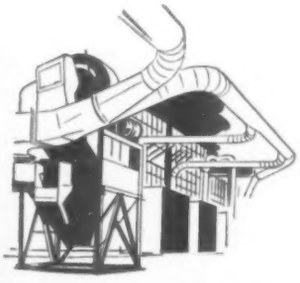
K & B Engineers determine the pipe sizes and correct location of the hood opening.

● Foundry men agree that of all dust sources, the shakeout is by far the worst and most troublesome. Without adequate control of dust and fumes at the shakeout, other forms of foundry ventilation are of little practical value.

Knowing these facts from extensive experience, Kirk & Blum have long specialized in the planning, designing, and installation of efficient and dependable systems for the control of shakeout dust and fumes. Like all K & B installations, these systems are *correctly engineered and custom-built* to fit the individual job —and guaranteed to provide *maximum efficiency at minimum operating cost.*

For complete details, including names of leading foundries utilizing our services, write us at the address below.

THE KIRK & BLUM MANUFACTURING CO., 2808 Spring Grove Ave., Cincinnati 25, Ohio.

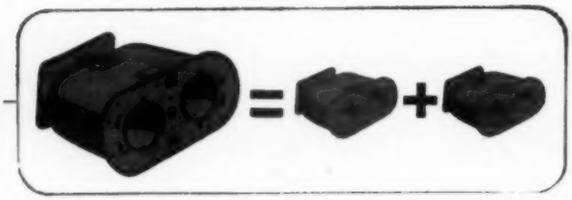


K & B Engineers select the right type of exhaust equipment to produce the desired airflow.

KIRK AND BLUM

K & B Engineers design the equipment to provide for proper clearance, safety, and visibility of crane operators.

The actual installation, made under rigid engineering supervision, is carefully scheduled to assure minimum interference with foundry operations.



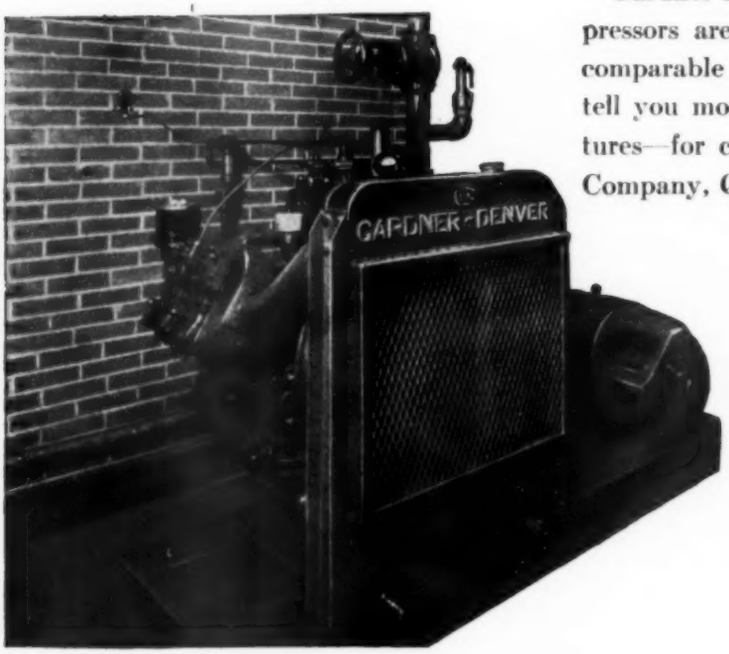
for you . . .

we made little cylinders out of big ones!

Conventional air compressor design calls for one large, low pressure cylinder in conjunction with each high pressure cylinder. But Gardner-Denver engineers were not satisfied merely to follow established practice. So, in designing the Class WB Two-stage Vertical Water-cooled Compressors, Gardner-Denver engineers put in *two* small diameter, low pressure cylinders for each high pressure cylinder.

Thousands of "WB" compressor owners have reaped the benefit! For the unique "WB" design permits lower air temperatures—with corresponding saving in horsepower. Inertia loads are reduced because all pistons can be small and lightweight. Better water cooling is possible—and that, in turn, means better lubrication, reduction of cylinder distortion, and longer life. "Oil thinning" is eliminated and thus much less lubrication oil is used.

Gardner-Denver "WB" Vertical Water-cooled Compressors are remarkably compact—yet have efficiencies comparable to that of large horizontal compressors. Let us tell you more about their space-saving, cost-saving features—for complete information, write Gardner-Denver Company, Quincy, Illinois.



Gardner-Denver Class "WB" Two-stage Vertical Water-cooled Compressor—available with built-in motor with V-belt or direct drive. Capacities 142 to 445 cubic feet displacement per minute.

GARDNER-DENVER

Since 1859

3 OUTSTANDING ACHIEVEMENTS of NATIONAL SMELTING RESEARCH

TERNALLOY
ALUMINUM ALLOYS

exceptionally high strength on natural aging; dimensional stability; excellent machinability; good corrosion resistance.

ALLCAST
ALUMINUM ALLOY

a high quality, general purpose casting alloy that provides superior mechanical properties with a worthwhile saving.

RED-X
ALUMINUM ALLOYS

for critical castings. Flexible composition permits adaptability to the particular casting requirement.

Write for illustrated booklets on these aluminum alloys — products of National Smelting research.

THE NATIONAL SMELTING COMPANY
6706 GRANT AVENUE • • CLEVELAND 5, OHIO

NATIONAL SMELTING

HOW we increased Tonnage 30% with HYDRO-BLAST

Kutztown Foundry and Machine Corporation of Kutztown, Pa., tells of methods which broke a bottleneck in the cleaning room.

WHAT WE SAW:

"Our casting production hobbled, held back by our limited capacity to clean and chip castings—basically a problem of man-power

"Labor cost per ton for cleaning ran excessively high

"And castings were not thoroughly cleaned"

WHAT WE DID:

"We installed a Hydro-Blast unit for knocking out cores and cleaning castings by the wet sand and water method"

WHAT WE GOT:

"**Tonnage jumped immediately** from 600 tons to 800 tons per month with the same man-power

"Average cleaning time was cut 80 percent

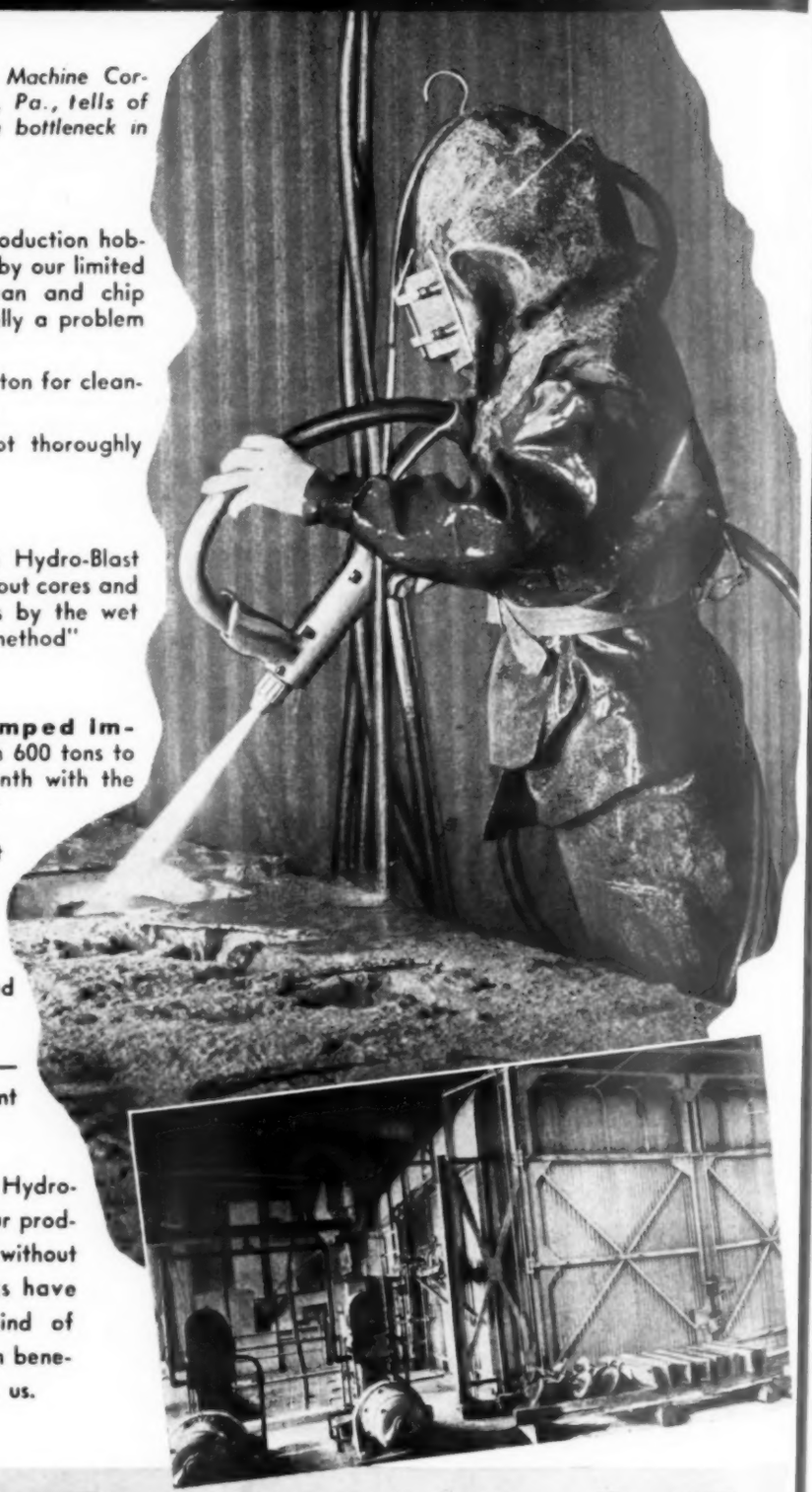
"Castings are cleaner—surgically clean!

"Big drop in per-ton cost of cleaning

. . . not to overlook these by-products:

"We're building a good stock pile of washed sand, and re-using it for facing and cores

"Gone is the dirty, dusty cleaning room — replaced by a clean, wholesome, pleasant place to work."



You can count on just such results with Hydro-Blast—depending on the nature of your products and the size of your plant. For without exception, Hydro-Blast installations have brought vital economies in every kind of foundry. Find out how Hydro-Blast can benefit you—no cost or obligation. Write us.

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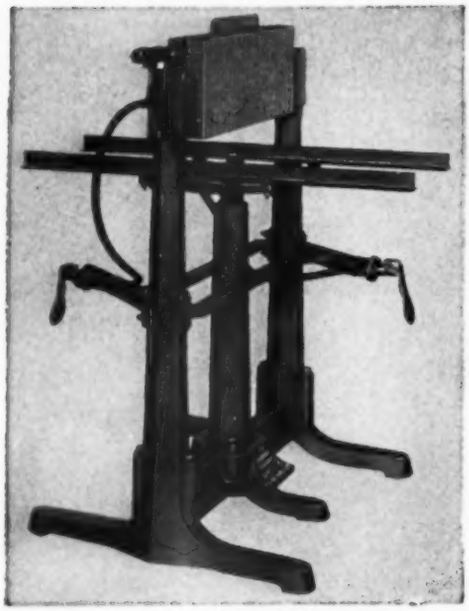

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Made in two styles: the floor model shown above and the portable bench model below.

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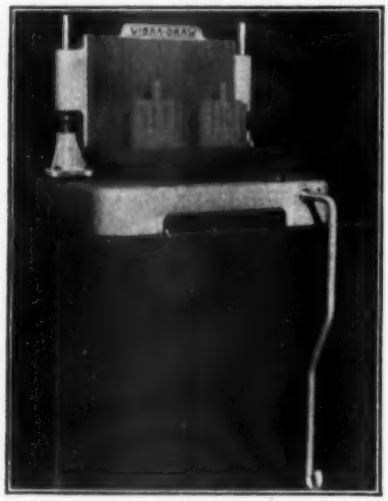

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Look at the smooth machined surface of the pattern pictured above. Soon this big pattern — dimensionally accurate, machined to thousandths of an inch will produce low cost castings in volume for a leading manufacturer — with a minimum of scrap. Why not get the extra benefits of Buffalo's fifty years of "know how" with your next pattern regardless of size — no matter how intricate — write, wire, phone.

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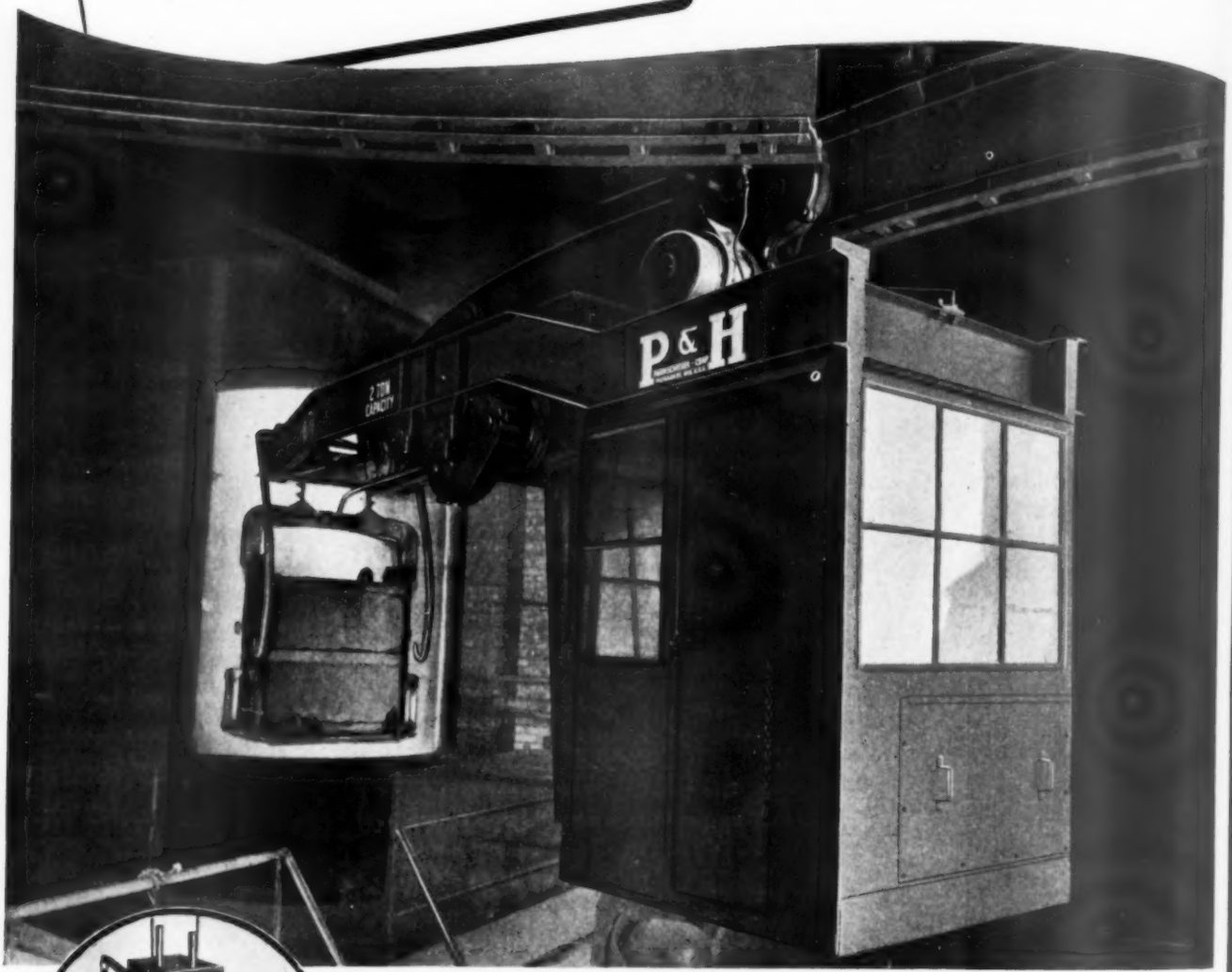
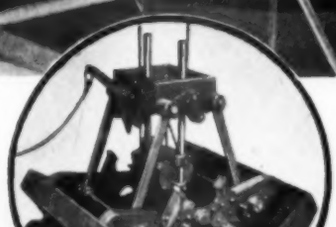
You can drop the charge from a fixed height or you can control the charging height. With P&H charging buckets, you can spread charges evenly across the bed or around its perimeter.

Ask us to send your copy of Foundry Bulletin C-37 for further information.





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Capacities of ½ to 2½ yards. Just hang one of these buckets on the crane hook and handle any bulk material—sand, crushed stone, coal, coke, cinders, etc. Unload cars, clean floors, dig pits, fill flasks . . . a labor-saver if there ever was one! Write for Bulletin C-27.

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identified by their color, are made from select raw materials. Usually termed "conventional core oils."

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give the same results as our Golden Core Oils, but are made from off-colored materials which are dark in color and cost much less.

CERTIFIED RAPIDRY CORE OILS

are also dark in color and considerably lower in price. They bake quicker in the oven or at a lower temperature and provide more readily collapsible cores.

Whether it be a single core for a king sized casting, or a great number of small cores for a production run of duplicate castings, Certified Core Oils provide the important advantages which result in better cores and lower costs:

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- Provides proper grain coating.
- Faster and more uniform mixing with any type of sand.
- Works clean in the boxes — does not stick.
- Assures cores of maximum strength.
- Permits minimum baking time, or lower oven temperature.
- Results in less gas and smoke in the core room and during pouring.
- Provides easy shake-out, because of readily collapsible cores.
- Gives the greatest ultimate economy.

No single grade of core oil will give the above results under all operating conditions, which is why we have so long insisted that "Core oils to be right must be prescribed." Certified Core Oil is made in the three general types listed at the left. Each of these types is made in a number of grades; one of which will prove the final answer to your core oil problem. Knowing your operating conditions, we can prescribe the proper grade for you.

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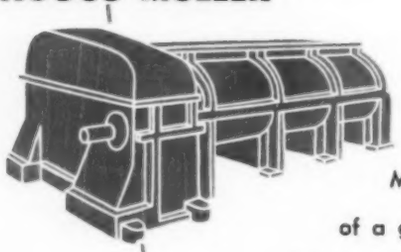
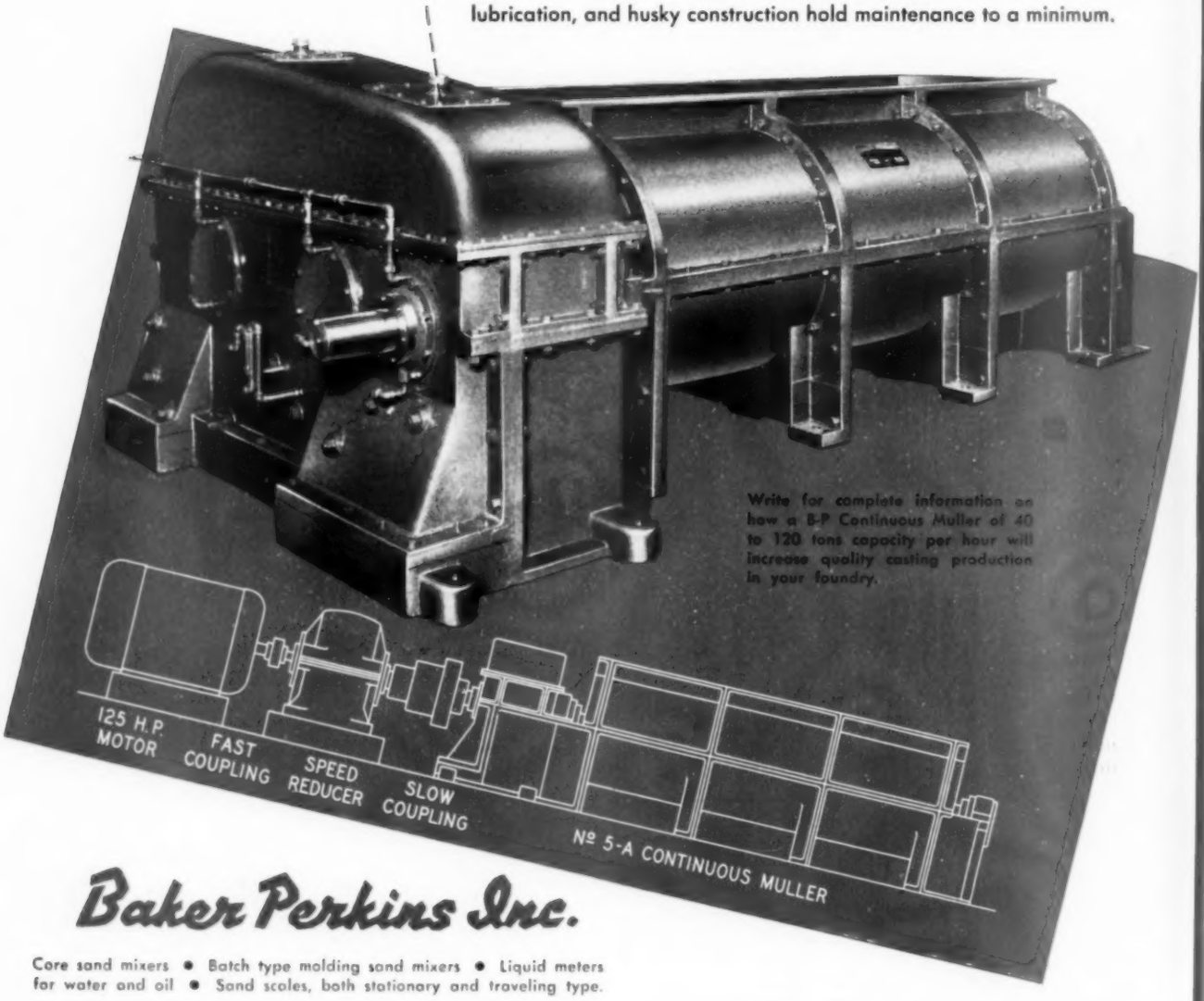
FOR BETTER CASTINGS, USE MOLDS MADE OF SAND PROCESSED IN A B-P CONTINUOUS MULLER



Many foundries for years have been insuring production of a greater number of acceptable castings by making molds of sand which has been mulled in a B-P Continuous Muller. This fast production muller thoroughly aerates and mixes the tumbling mass in a continuous figure 8 motion. Each grain is coated with the correct proportion of bond, assuring a mold which will produce smoother finished castings. The No. 5-A B-P Continuous Sand Muller illustrated delivers 100 to 120 tons of perfectly mulled sand per hour. Anti-friction bearings enclosed in dust-tight housings, automatic lubrication, and husky construction hold maintenance to a minimum.



Write for complete information on how a B-P Continuous Muller of 40 to 120 tons capacity per hour will increase quality casting production in your foundry.

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Core sand mixers • Batch type molding sand mixers • Liquid meters for water and oil • Sand scales, both stationary and traveling type.

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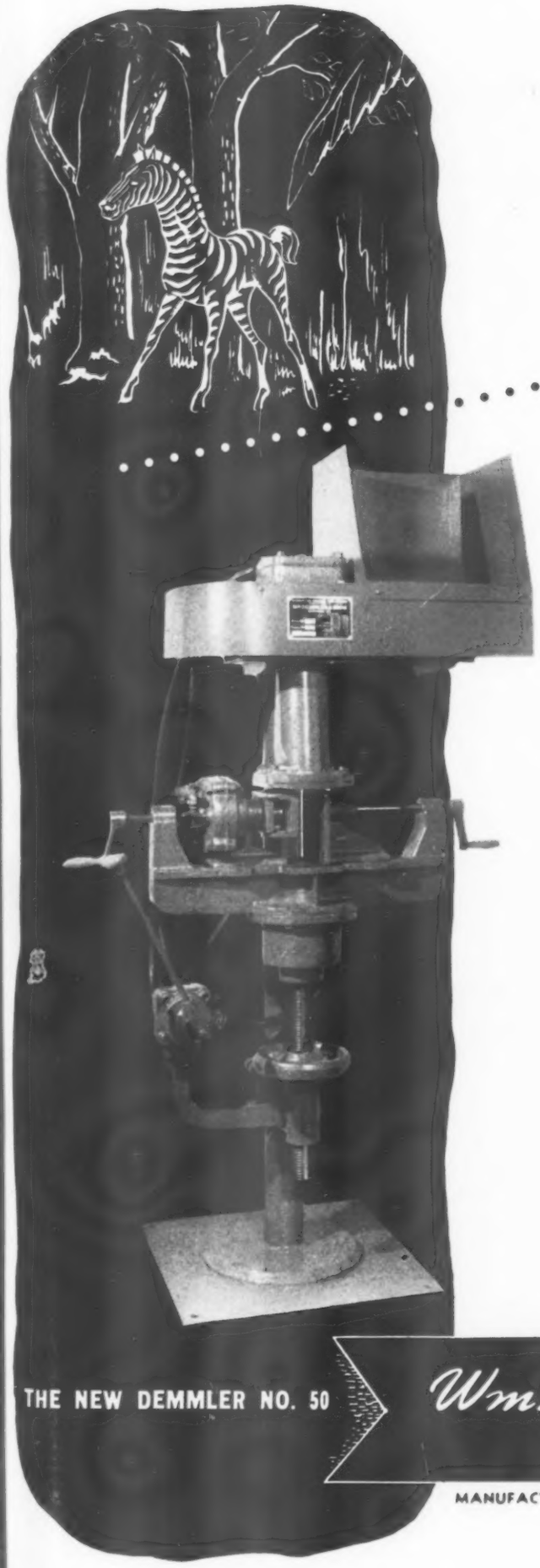

ESPECIALLY ADAPTED

The zebra's stripes are perfect camouflage, making him especially adapted to the terrain in which he lives. The new DEMMLER No. 50 core blowing machine is especially adapted, too—especially adapted to short run jobs on small cores because of its quick, easy adjustments and simplicity of operation.

There is no small core blowing machine on the market today that offers so much for so little!

The DEMMLER No. 50 is a DEMMLER machine throughout—a machine you will be as proud of 10 years from now as today! It is equipped with both vertical and horizontal automatically operated air clamps. In fact, most of the important features of the large DEMMLER models are found on this reasonably priced machine.

The DEMMLER No. 50 is capable of blowing 200 cores an hour—every hour—and will easily handle cores weighing up to three pounds.

Height of the table is adjustable from 30 to 36 inches for the comfort of whoever operates it, and ANYONE can operate the DEMMLER No. 50! By means of a single hand valve, the core box is clamped and the core blown in but three seconds. No installation is necessary. Connect to an air hose and the machine is ready to use.

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THE NEW DEMMLER NO. 50

Wm. DEMMLER & Bros
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MANUFACTURERS OF CORE BLOWING EQUIPMENT EXCLUSIVELY SINCE 1911

Fuel costs reduced

66 2/3 % WITH GAS

Mr. C. D. Pruden, Vice-President and Manager, points out several additional advantages of GAS-fired ovens:

—***unexcelled uniformity of product***

—***increased production through rapid baking***

—***cleanliness of core-rooms***

—***safety of operation***

—***simplicity of controls***

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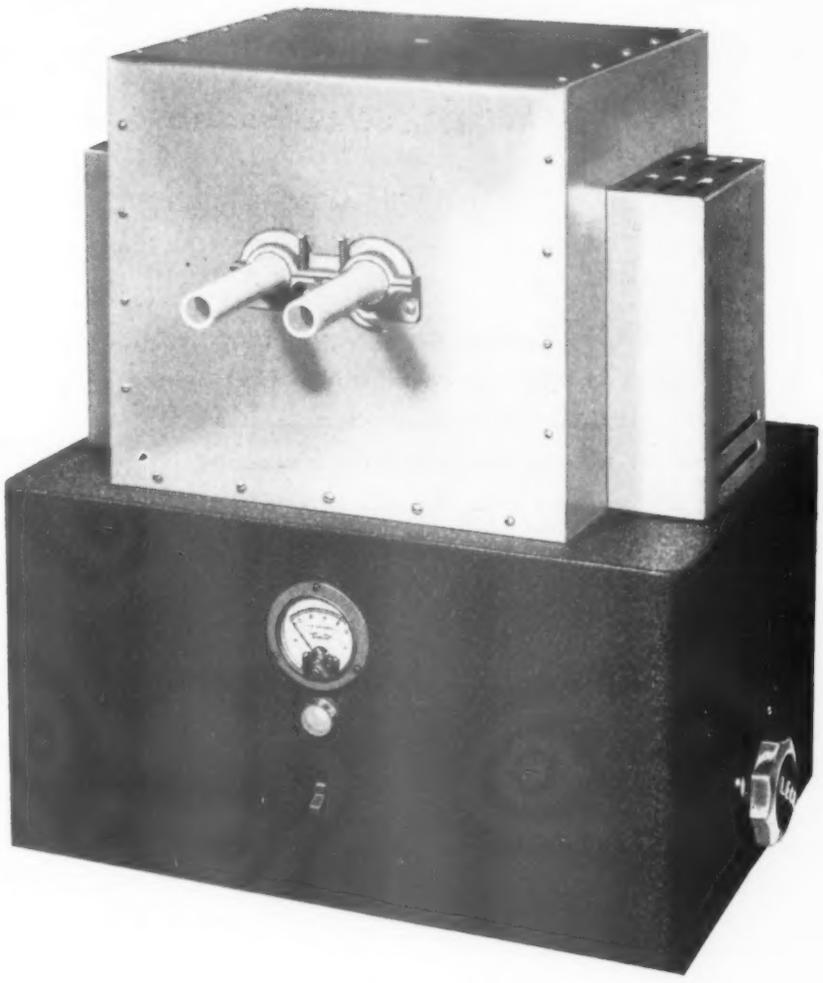
Leco No. 100 Combustion Furnace with Power Unit and Controls **$250.00**
Set of 3/4" Globar Elements (extra) . **$15.30**



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Foundry Costs Need Close Study Today

FOURTEEN months since V-J Day finds the foundry industry faced with not only a demand for certain types of castings which rivals the requirements of wartime, but also with the prospects of continued active business for an extended period. And while the difficulties connected with obtaining sufficient raw materials and labor to meet current needs absorb the industry's major attention, the subject of cost reductions should receive equal consideration—because obviously the time will come when it no longer will be possible to accept only the most profitable type of orders.

It is equally obvious that the vitality of the foundry industry—just as that of any other industry—will be measured to a large extent by the margin between the cost of making its products and the price at which it is able to sell them.

Frequent reference has been made to the laxity of too large a part of the foundry industry in maintaining adequate cost controls, and the necessity of eliminating unprofitable prices through a complete understanding of costs cannot be overemphasized. At the same time, it also is hazardous to the industry's competitive position to fail to examine all means through which costs can be reduced.

The multitude of operations involved in the production of castings naturally provide many opportunities for either waste or savings which, even though individually minor, add up to considerable sums in total. By scrutinizing carefully each of these operations better methods and accompanying cost reductions frequently will be suggested.

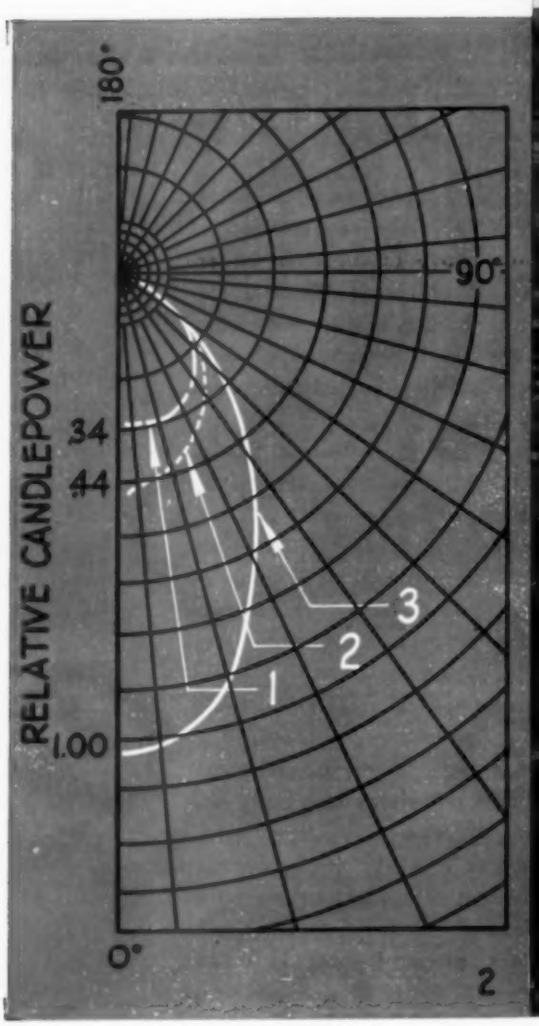
In addition to a study of individual foundry practices it is also important that overall plant conditions be examined for possible betterment in production efficiency. While ventilation and dust control have been the subjects mentioned most frequently in connection with improvements in working conditions, proper lighting is a field which should not be overlooked, because it offers a possible source of rich dividends in the form of increased output and improved quality of product. Major developments have occurred in recent years in equipment for plant illumination, and the supposedly well lighted foundry of a decade or two ago would fall short of today's standards. A study of the foundry lighting recommendations contained in the article starting on page 82 of this issue should suggest opportunities to many companies for improving plant illumination and workers' efficiency.

Plant maintenance is another possibility for concrete savings that is likely to be overlooked. The most modern equipment available is relatively ineffective from a cost-saving standpoint unless kept in first-class operating condition. All equipment should be checked regularly to determine if it is measuring up to its rated performance.

Future of the foundry industry is bound up to no small degree in the success with which it is able to compete with other forms of engineering materials on both a quality and price basis. Consequently, every opportunity seized for cost savings not only means a wider profit margin but also tends to broaden the market for castings. And today is not too early to prepare for the stiffer competition of tomorrow.

William G. Gude

Managing Editor



Planned for the MODERN FOUNDRY

By WILLIAM H. KAHLER
Lighting Engineer
Westinghouse Electric Corp.
Cleveland

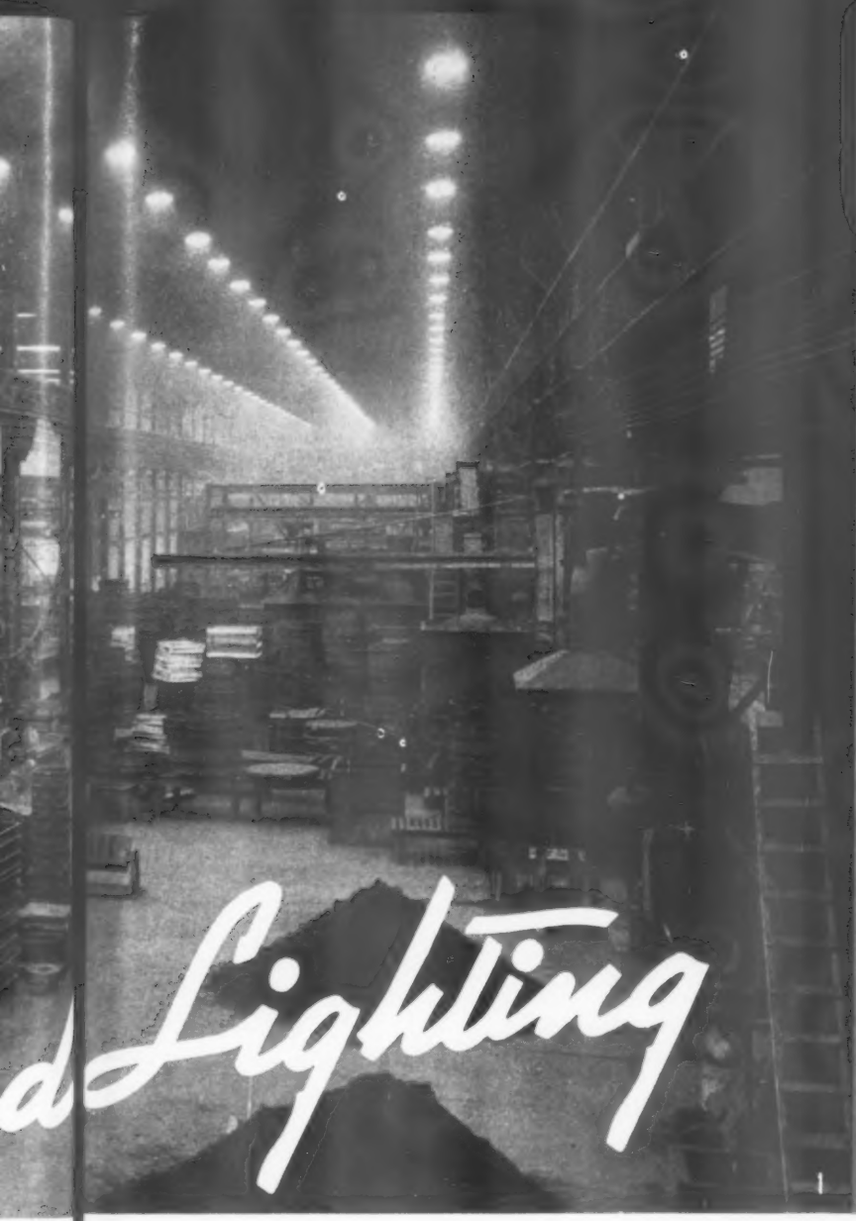
Fig. 1—A modern foundry with modern lighting. Here 750-w enclosed high-bay luminaires are installed on 16 x 16-ft. centers at 35-ft. mounting height, giving average illumination of 15 ft-c. Fluorescent system at left provides exceptional light quality but requires considerably more maintenance than enclosed incandescent units

Fig. 2—Laboratory distribution curves illustrate effect of dirt accumulation on open type high-bay reflector after two years:

	Relative Efficiency	*Relative Max. Candlepower*
(1)—As found	0.58	0.34
(2)—Dry wiped	0.65	0.44
(3)—Washed clean	1.00	1.00

Fig. 3—These curves are from an enclosed dust-tight luminaire installed in the foundry:

	Relative Efficiency	*Relative Max. Candlepower*
(1)—As found	0.93	0.92
(2)—Dry wiped	0.95	0.97
(3)—Washed Clean	1.00	1.00



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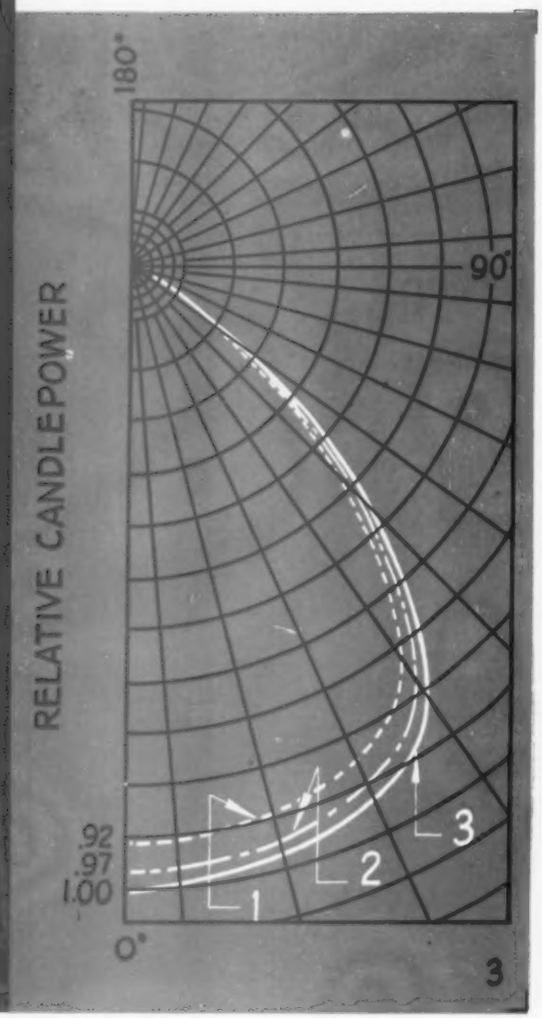

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IN RECENT years, industry has been shown that a foundry need not be a dirty, unhealthy plant, but can be relatively clean and present no particular health hazards to the workmen. Measures directed primarily to the safety and health of the workers—such as smoke and dust control, ventilation, safety precautions and lighting—all contribute to better working conditions. Adequate lighting provides no small measure of improvement in working conditions and contributes in many ways to better production and fewer rejects.

But lighting in many of our foundries is still far below accepted standards for comfortable, easy seeing. In certain foundries which the author recently visited, it was found that the lighting consisted of bare lamps on extension cords wrapped around the machine handles, that illumination levels were exceptionally low and that harsh shadows and glare were present in many locations. In one foundry is was found that the workers were using flashlight to place cores properly. Such conditions as these are handicaps to good workmanship and may contribute to employee discontentment.

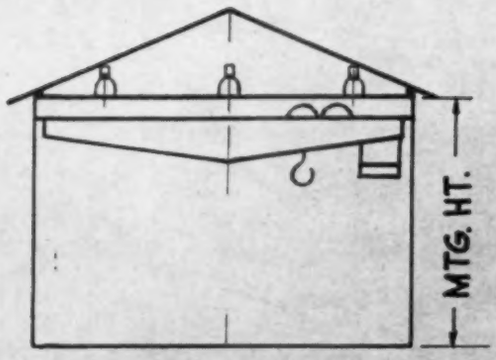
As in other industries, we know that good lighting in the foundry pays dividends. In a recent article in *Southern Power and Industry*, Col. William B. Estes cites an example of the actual results of improved illumination in a foundry in Texas. The illumination as found was 1½ to 5 footcandles and the net production was .327 tons per man-hour. This foundry was relighted to 20-25 footcandles and the tons per man-hour increased to .372, or a net gain of 14 per cent. A 14 per cent increase in production certainly will more than pay for the installation and operational cost of the adequate lighting system.

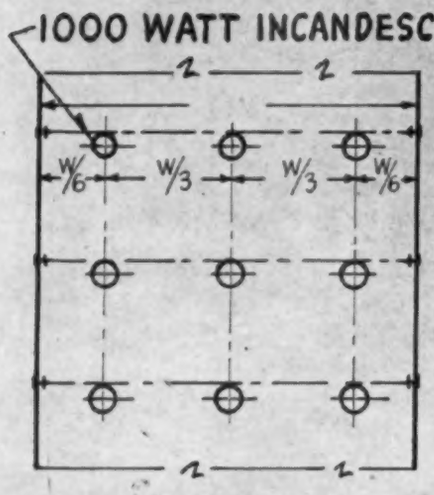
In a foundry in Cleveland that was recently relighted it was noted that production was aided and fewer castings were rejected because of defective molds. It was also found that housekeeping, general working conditions and safety were improved.

The secret to designing any adequate lighting system is to plan the system carefully. This planning procedure for the foundry can be divided into six steps:

1. Analyze the requirements for lighting.
2. Determine the quantity and quality of light necessary to meet these requirements.
3. Select the light source or sources.
4. Choose suitable luminaires.
5. Make a layout for the lighting.
6. Plan the maintenance procedure.

Requirements—The designer of the lighting system





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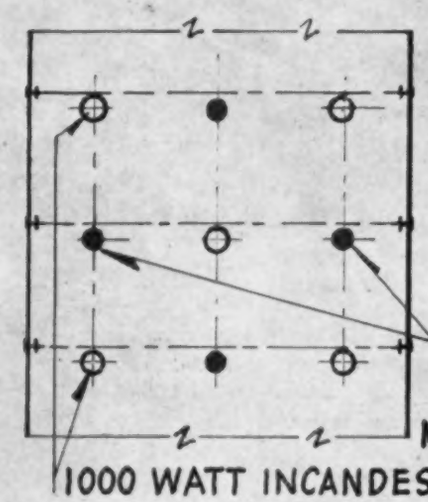

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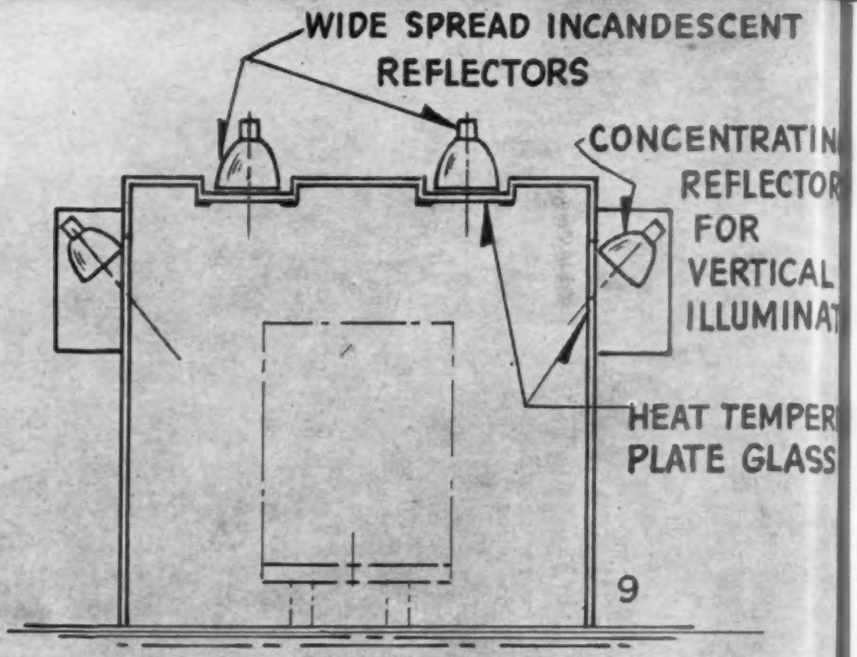

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Fig. 4—Symmetrical layout of incandescent (or mercury) high bay reflectors mounted on roof trusses

Fig. 5—Staggered layout of incandescent and mercury units commonly used to furnish a desirable color quality of light makes use of advantages of both sources

Fig. 6—Tandem arrangement of mercury and incandescent luminaires is particularly suitable for lower mounting heights where high level, low cost illumination is required, because only one outlet is needed for two reflectors and good color mix results

Fig. 7—The 3-kw mercury luminaire is ideal for foundries if mounting height is 40 ft or more, as high intensities can be obtained with relatively few units

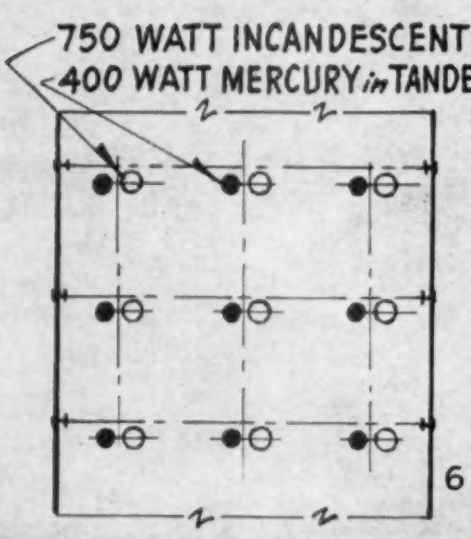
Fig. 8—Luminaires in coremaking department should be mounted directly over front of bench to minimize shadows in deep cavities

Fig. 9—Sandblast chamber. Light should be directed through heat tempered glass windows to reduce breakage and maintenance

Fig. 10—Molding floor. Where overhead conveyors obstruct general lighting, supplementary luminaires should direct light into molds with minimum shadows

Fig. 11—Grinding department. One enclosed fluorescent luminaire for each stand grinder provides excellent illumination

Fig. 12—Inspection benches. A large light hood is ideal. Frequent maintenance is necessary unless hood is away from dust



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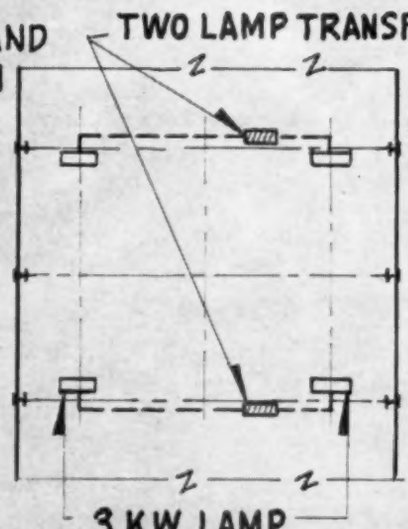

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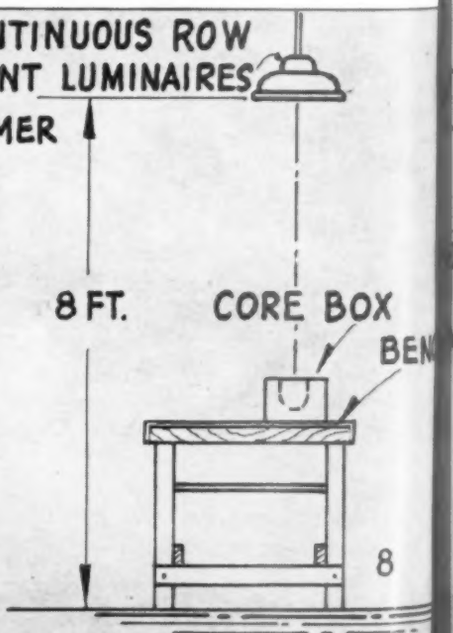


8

must first be familiar with foundry conditions and operations, plus the specific lighting requirements. Most foundries consist of a large general area plus adjacent small areas. Operations in the general area may consist of coremaking, molding, pouring, shakeout and cleaning. The supplementary spaces may include pattern shop, flask repair, coremaking, cleaning, cupola charging, inspection, and storage of patterns, molds and raw materials.

The main area is generally a high bay space containing an overhead traveling crane, while adjacent spaces have a relatively low ceiling without the crane facility. Thus the mounting height of the lighting in the main area is established by the required clearance height above the crane, while lower mounting is possible in adjacent areas.

Most foundry operations tend to create a dusty or smoky atmosphere. Even with adequate ventilation and dust control, dust will collect on lighting equipment.

This accumulation of dry dust will adhere to reflectors because it absorbs moisture and the lamp heat produces a baking effect. Therefore, this dust condition must be recognized when the luminaires are selected.

Quantity and Quality—The quantity of light or foot-candles required depends upon the severity of the seeing tasks, since precision work requires more light than rough operations. For a guide in selecting the illumination level, refer to the following table. These are minimum values and generally higher levels can be used with corresponding increased benefits.

Recommended Minimum Illumination Levels

	Foot-candles In-service
Charging floor, tumbling, pouring and shakeout	5
Rough molding and coremaking	10
Fine molding and coremaking	20
Cleaning and grinding	30
Inspection:	
Rough	20
Medium	50
Fine	100
Pattern shop	50
Flask repair	20
Storage	5

The quality of light refers to such factors as glare, shadows and distribution. Lamps must be shielded by proper reflectors to prevent direct glare in the normal field of vision. Luminaires must be so selected and arranged to prevent harsh shadows. Also luminaires must be so located that illumination distribution will be relatively uniform.

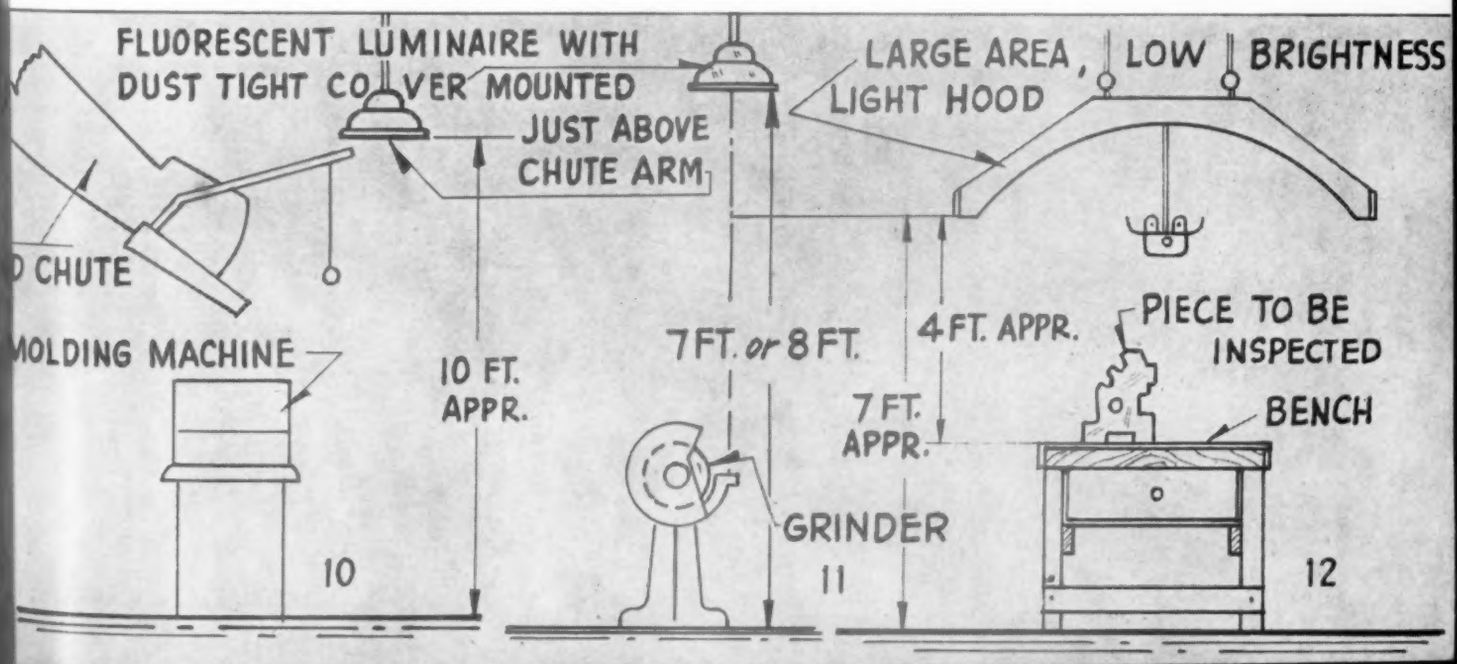
Light Sources—Light sources available today for industrial lighting are incandescent, mercury and fluorescent lamps. Both incandescent and mercury lamps are particularly suitable for the high mounting main area because high wattages can be used and thus a minimum number of units is required. These sources can also be used in reflectors of proper shape to direct the light in a concentrating or medium distribution to produce maximum illumination on the working area.

Fluorescent lamps may be used to best advantage in the foundry for supplementary lighting, pattern shop, coremaking and other locations where high quality light is necessary and where luminaires are relatively easy to service.

Selecting Luminaires—Many types of luminaires are available for the sources previously mentioned, but it is important to select equipment to meet foundry conditions. The foundry is classed as a heavy industry and heavy duty durable equipment should be specified. Field tests have proved that totally enclosed dust-tight luminaires are giving exceptional results compared to open reflectors. In an industrial plant twelve 500-w enclosed units were installed at 41 ft mounting height and the illumination was 6 ft-c. after three-years' service. In an adjacent area where conditions were similar except for open type high-bay reflectors, the illumination was found to be only 2 ft-c. The marked difference was due entirely to the result of dirt accumulation on lamps and reflectors.

Laboratory tests conducted with two luminaires taken from service in another factory produced similar results.

Fig. 2 shows photometric tests of an open type, concentrating 1000-w high-bay unit which had been in service for several years in a factory area. Dirt accumulation not only reduced the overall efficiency, but also completely changed the light distribution to that of a widespread reflector, as the dirt film temporarily destroyed the definite control of the reflecting surface. For this reason, relative maximum candlepower was reduced to 34 per cent, while efficiency dropped to 58 per cent. It should be noted that merely wiping the reflecting (*Please turn to page* 226)



Continuing his discussion of pattern storage which was presented in the September issue, the author lists the requisites for an adequate system of pattern records

Pattern

A GOOD filing system makes for easy location of pattern equipment. The filing cabinets, like all other pattern storage building equipment, should be fireproof. Some companies use a safe provided with file drawers. This not only is fireproof, but it prevents record tampering by unauthorized individuals. While many variations of record cards are available, it is the author's intention merely to list such information as would be useful to compile a complete pattern record; from this list may be chosen those items which seem of most importance to the individual in setting up a record card to fill his specific needs. Much of this required information may be abbreviated, initialed or symbolized, thus conserving on card size.

The following comprises various information pertinent to maintenance of an adequate pattern record, together with suggested abbreviations for certain notations:

1. A pattern number as a means of part identification.

2. Drawing or blueprint number if other than the pattern number.

3. Pattern material: Wood, wax, plaster, metal (iron, brass, aluminum).

4. Kind of pattern (moldability): Loose (*lse*); gated (*gtd*); match plate (*m ch pl't*); cope and drag (*c & d*); sweep (*sw'p*); skeleton (*sk'n*); segmental (*seg'*); sectional (*sec*); stripping plate (*str. plt*); master (*mstr*).

5. Accessories included: core gage (*c. gage*); bed-in box (*bd bx*); driers (*drs*); mold boards (*md. bd*); sand match (*sd mch*); follow board (*f. bd.*); special flasks (*spc. fl.*); pattern parts (*patt. pts*); number of coreboxes (*no. cbx*); corebox loose pieces (*cbx pcs*).

6. A sketch or description of pattern with approximate overall dimensions. A sketch will tell the layman much more than a blueprint.

7. Whether one pattern is used for another, as right and left (*R. & L.*), or by addition of extra pieces (*ex. pc.*).

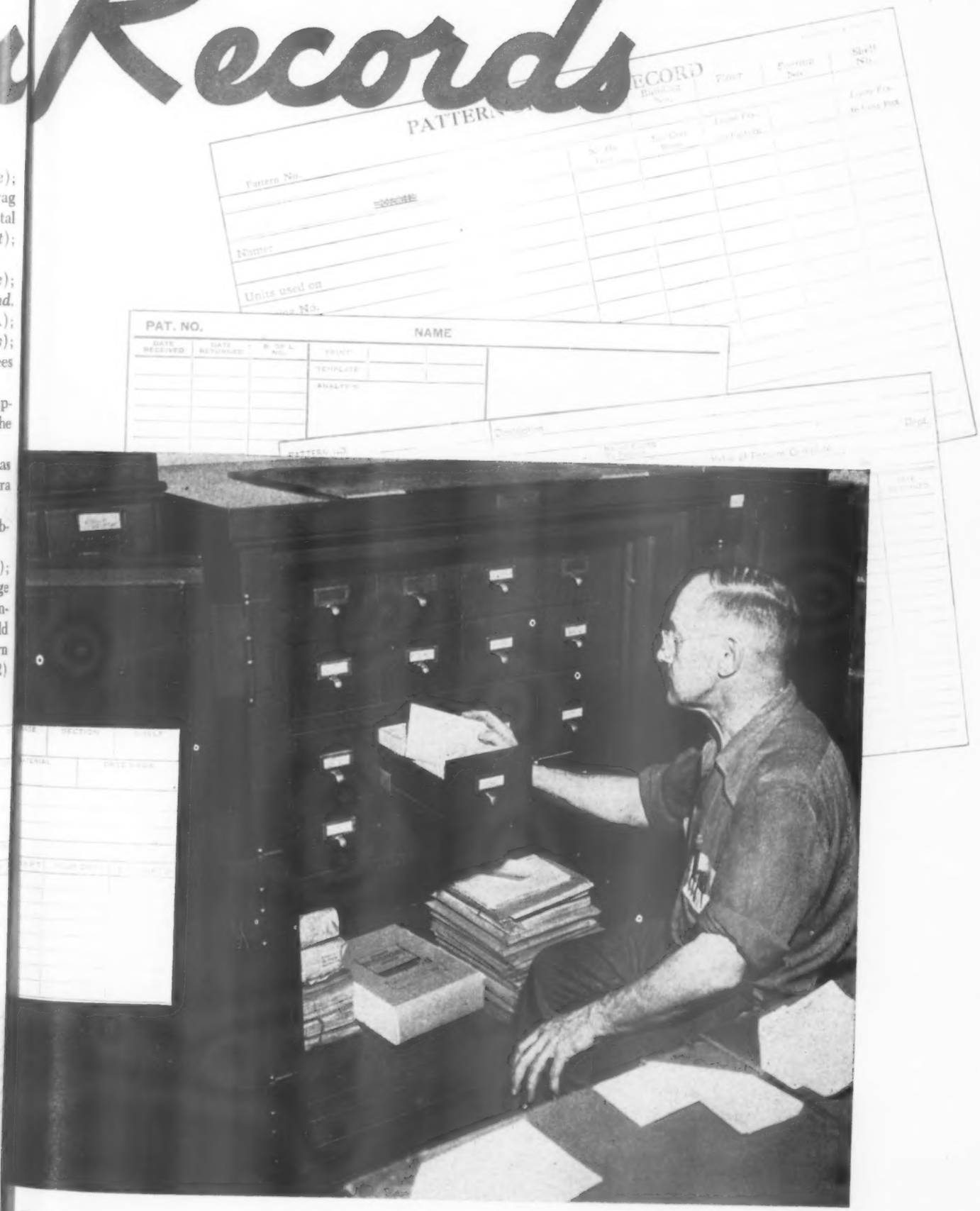
8. Date made. This is helpful in deciding obsolescence.

9. Condition of pattern: Good (*G*); fair (*F*); poor (*P*); make over (*m'ke*). This might change every time pattern is shipped out and should be included next to "date shipped." Poor patterns should be so listed. This list should be kept in the pattern shop and duplicated in the (*Please turn to page* 202)

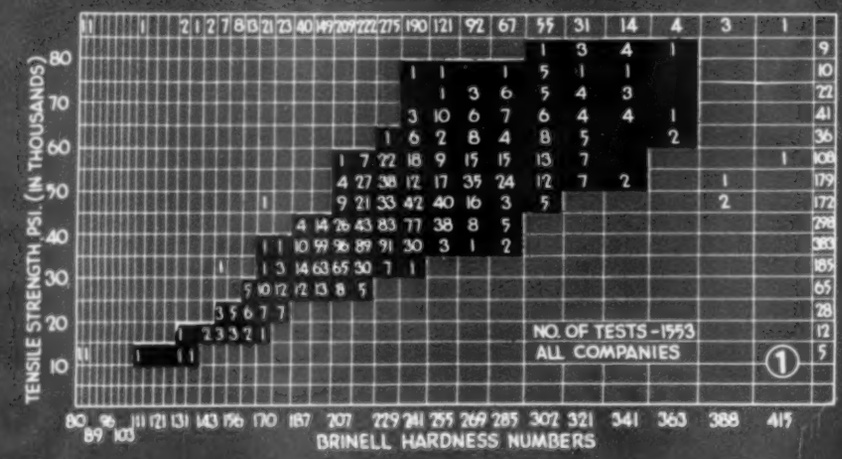
***Right*—Pattern clerk Frank Jamison at the pattern vault office of Westinghouse Electric Corp., Cleveland. The modern file safe is fireproof and prevents unauthorized individuals from tampering with pattern records**

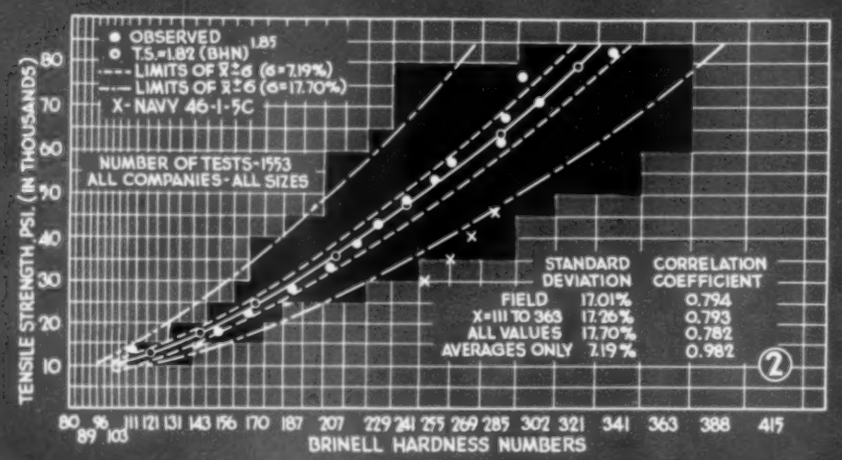
Records

By FRANK C. CECH
Cleveland Trade School
Cleveland



Brinell Hardness of GRAY CAST IRON —its relation to other properties


TENSILE STRENGTH, PSI. (IN THOUSANDS)
NO. OF TESTS-1553
ALL COMPANIES
①
80 89 96 103 111 121 131 143 156 170 187 207 229 241 255 269 285 302 321 341 363 388 415
BRINELL HARDNESS NUMBERS


OBSERVED
T.S.=1.82 (BHN)^1.85
LIMITS OF X̄±σ (σ=7.19%)
LIMITS OF X±σ (σ=17.70%)
X- NAVY 46-1-5C
NUMBER OF TESTS-1553
ALL COMPANIES-ALL SIZES
STANDARD DEVIATION
CORRELATION COEFFICIENT
FIELD 17.01% 0.794
X=111 TO 363 17.26% 0.793
ALL VALUES 17.70% 0.782
AVERAGES ONLY 7.19% 0.982
②
TENSILE STRENGTH, PSI. (IN THOUSANDS)
80 89 96 103 111 121 131 143 156 170 187 207 229 241 255 269 285 302 321 341 363 388 415
BRINELL HARDNESS NUMBERS

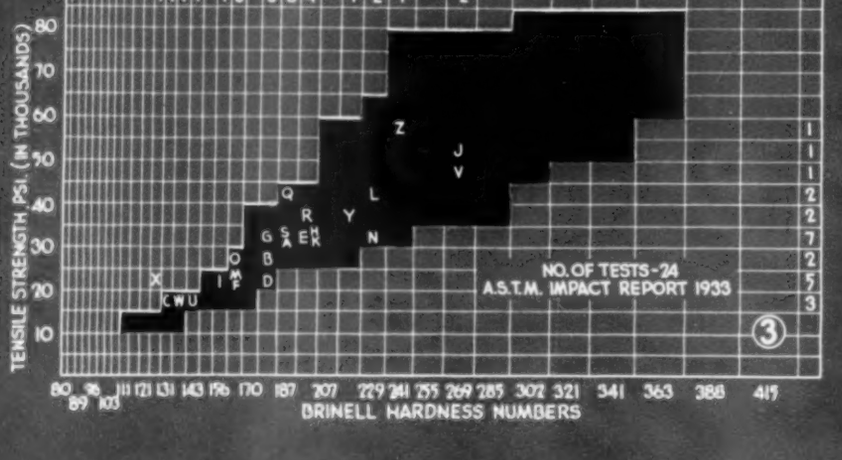

NO. OF TESTS-24
A.S.T.M. IMPACT REPORT 1933
③
TENSILE STRENGTH, PSI. (IN THOUSANDS)
80 89 96 103 111 121 131 143 156 170 187 207 229 241 255 269 285 302 321 341 363 388 415
BRINELL HARDNESS NUMBERS

Fig. 1—Data for tensile-brinell relationship from 1553 tests. Figures refer to number of tests

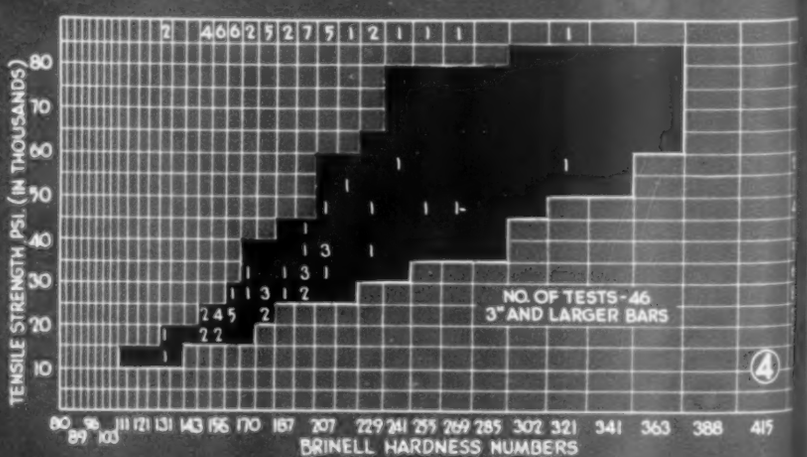
Fig. 2—Statistical analysis of data in preceding figure

Fig. 3—Data from 1933 report of ASTM Subcommittee on Impact

Fig. 4—Tensile-brinell relationship for bars 3 in. diameter and larger

Fig. 5—Results of study of inoculated irons

Fig. 6—Ratio of transverse strength to tensile strength for 1.20-in. bar


NO. OF TESTS-46
3" AND LARGER BARS
④
TENSILE STRENGTH, PSI. (IN THOUSANDS)
80 89 96 103 111 121 131 143 156 170 187 207 229 241 255 269 285 302 321 341 363 388 415
BRINELL HARDNESS NUMBERS

By DR. JAMES T. MacKENZIE
American Cast Iron Pipe Co.
Birmingham

DURING the last few years there has been an increasing tendency to introduce a maximum value for brinell hardness in specifications for gray cast iron which call for a minimum tensile strength. This is a simple, convenient and reasonable method of obtaining the desired machinability without using the dubious alternative of putting a maximum on the strength, since it is hardly conceivable that a casting could be too strong if the unnecessary strength is obtained without sacrifice of other desirable properties. Navy Department specification 46-I-5C carries such a specification with the following limits:

Ten. Str. Min. psi	Bhn Max.
30,000	250
35,000	260
40,000	270
45,000	280

These values are indicated in Fig. 2. In order to have some reliable criteria for setting up such specifications, Committee A-3 asked the author to make a study of the available data and present it in condensed form so that consumer and producer could see whether any given limitation of hardness was or was not within reason for the tensile strength required.

The following firms contributed tests results: American Cast Iron Pipe Co., Buffalo Foundry & Machine Co., Climax Molybdenum Co., Cooper Bessemer Corp., Deere & Co., Farrel Birmingham Co., and International Harvester Co.

A great deal of the data is from experimental heats but much more from actual operations. Most of the experimental heats were average results from duplicate (or more) bars and the operating results usually included from 10 to 50 readings from as many bars of each grade of iron being made. A total of 1553 sets were submitted showing both tensile and brinell. These were in the following sizes: Bar *A* (0.875-in.) — 145; Bar *B* (1.20.-in.) — 982; Bar *C* (2.0-in.) — 171; 3 to 10 in. — 46. Other results were from bars cut from the desired sections of actual castings.

This report on the relationship between the hardness of gray cast iron and various other properties was presented before the recent annual meeting of the American Society for Testing Materials

The data for tensile-brinell for all tests are shown in Fig. 1. The area in black contains all but eight of the results and will in the subsequent discussion be called the *Field*. The eight results omitted were the four at the right which had extremely high manganese and/or molybdenum and the two at bhn 86-89 were from a very heavy casting that had been in service over 30 years—presumably under considerable stress.

Data in Fig. 1 are analyzed statistically in Fig. 2, which shows the Field, the average values of both tensile strength and bhn for each tensile class (steps of 5000 psi), the equation of best fit calculated from the 1553 individual values by least squares, and the standard error and correlation coefficient, using the average value for each cell in Fig. 1 but giving the cell its full weight according to the number of tests. The standard error and correlation coefficient are shown for the Field; for all values of bhn from 11 to 363, for all values; and for the class averages only (the black dots). The Navy specifications, 46-I-56, are also indicated.

Several other equations were tried: The best straight line (least squares),

$$\text{Tensile (in thousands)} = 0.38\ (\text{bhn}) - 44.6$$

fits quite well from class 25 and above but the standard error is 23.5 per cent and calculated tensiles are much too low in the lower range.

The best hyperbola (least squares),

$$\text{Tensile (in thousands)} = \frac{46\ \ (\text{bhn})}{480 - (\text{bhn})}$$

also fits well from class 25 on up but gives tensile values too high in the lower groups.

Table I gives values for the tensile strength according to the parabola T.S. = $1.82\text{bhn}^{1.85}$ calculated for each 0.1 mm of diameter of impression from 3.2 to 5.8.

Table II shows the standard deviation of the bhn both in numbers and in percentage of the aver-

1.20" BARS (18" CENTERS)
TENSILE STRENGTH - PSI x 10⁻³
MODULUS OF RUPTURE - PSI x 10⁻³
TRANSVERSE LOAD - LBS x 10⁻²
T.S. = .83 (M.R.) 19,997
DEV. = 15.80%
CORR. COEF. = 8.65
6

Brinell Hardness of GRAY CAST IRON

Table I—Tensile = 1.82 (BHN)$^{1.85}$ for Gray Cast Iron

Diam. mm	bhn	Tensile (1000's)	Diam. mm	bhn	Tensile (1000's)
3.20	363	99.1	4.60	170	24.3
3.30	341	88.2	4.70	163	22.5
3.40	321	78.9	4.80	156	20.8
3.50	302	70.5	4.90	149	19.2
3.60	285	63.3	5.00	143	17.5
3.70	269	56.9	5.10	137	16.3
3.80	255	51.5	5.20	131	15.0
3.90	241	46.5	5.30	126	14.0
4.00	229	42.2	5.40	121	13.0
4.10	217	38.2	5.50	116	12.0
4.20	207	35.0	5.60	111	11.1
4.30	197	32.0	5.70	107	10.3
4.40	187	29.0	5.80	103	9.2
4.50	179	26.8			

Table II—Summary of the Brinell—Tensile Data

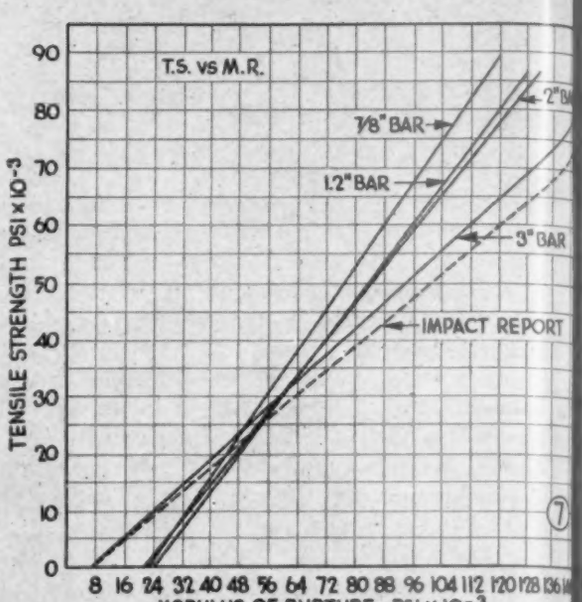
Tensile Class	No.	Avg. Tens.	Avg. bhn	Standard Deviation bhn	Std. Dev.* % Avg. bhn
10	5	13.1	111	21	19
15	12	17.7	153	11	7
20	29	22.6	166	10	6
25	65	27.9	187	16	8
30	185	33.1	204	12	6
35	383	37.4	216	16	7
40	297	42.6	230	19	8
45	172	47.0	243	27	10
50	179	52.3	255	33	13
55	108	56.9	262	35	13
60	36	62.3	285	33	12
65	41	67.3	286	32	11
70	22	72.4	302	25	8
75	10	76.9	294	29	10
80	9	82.5	335	19	6

*Note: These deviations are in per cent of the above averages for each tensile class, hence are not the same as that shown on Figs. 1 and 2 which are properly termed the standard error of the estimate.

Table III—Relation of Tensile to Transverse Strength

Size in.	Equation Constants m	b	Standard Error %	Correlation Coefficient r
0.875	.92	21,200	16.65	0.804
1.20	.83	20,000	15.80	0.865
2.0	.79	17,100	15.42	0.935
3.0	.57	4,100	13.24	0.946
All sizes (Avgs)	.79	16,600	10.69	0.990
Impact Report	.58	5,000	9.89	0.975

Equation, Tensile = m (Modulus of Rupture) − b



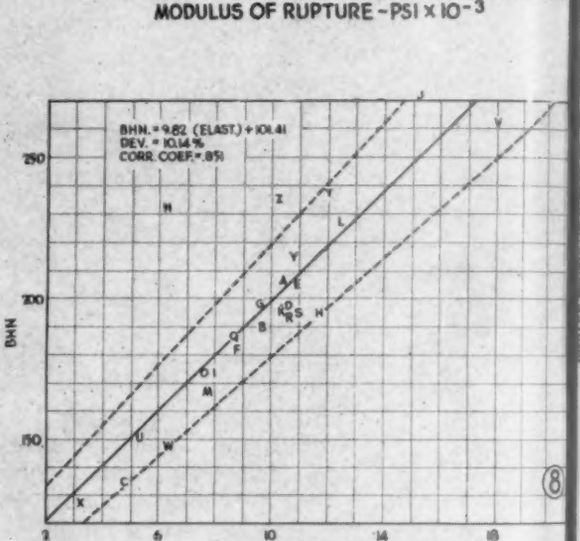


Fig. 7—Tensile strength vs modulus of rupture for various size bars

Figs. 8 and 9—Charts showing relationship between hardness and stiffness

Figs. 10 and 11—Relation of impact properties to various tensile-brinell ratios

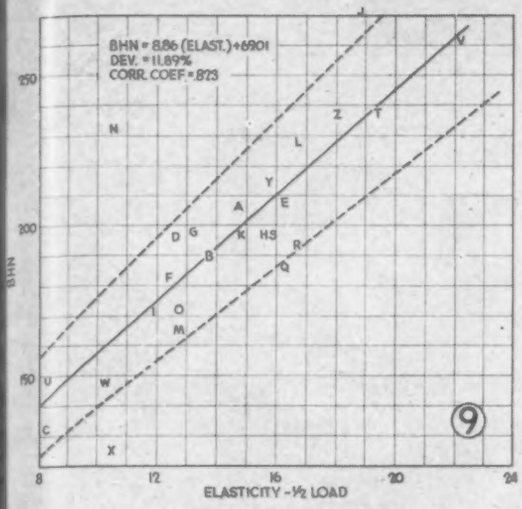
Figs. 12, 13 and 14—Tensile-brinell relationship for bars of different diameters

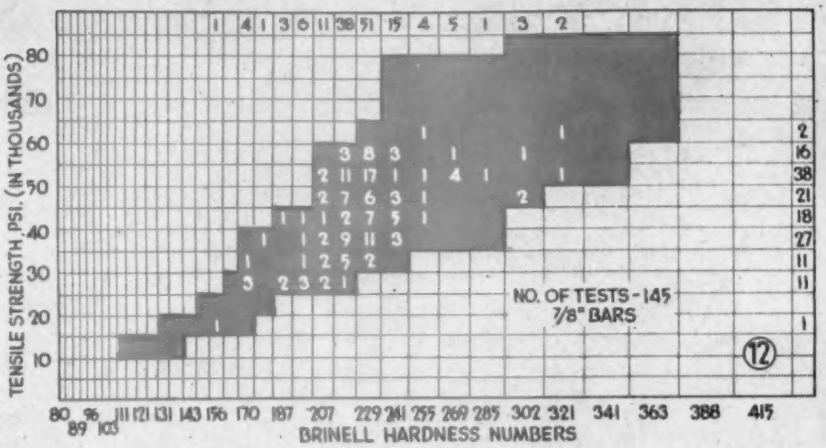
age for each class together with the actual average of the brinell and the tensile strength.

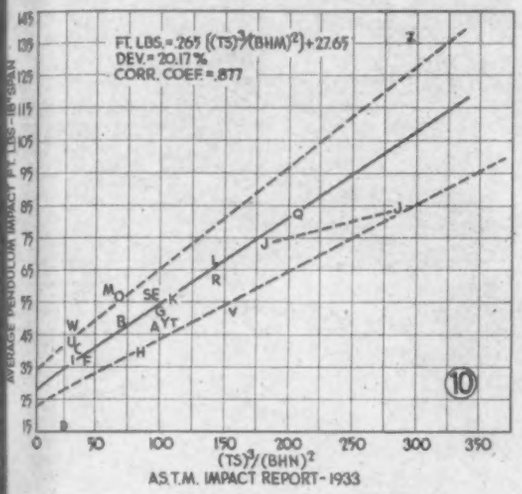
To illustrate the usefulness of the field, the data from the 1933 *Report* of the ASTM Subcommittee on Impact is plotted in Fig. 3. All of the 24 irons, except the austenite iron *X*, are in the Field—even the martensitic iron *N*, which, together with the 2 per cent P iron, is on the bottom line. Since there are by far the most carefully obtained values available, the confirmation of our present data is very satisfying.

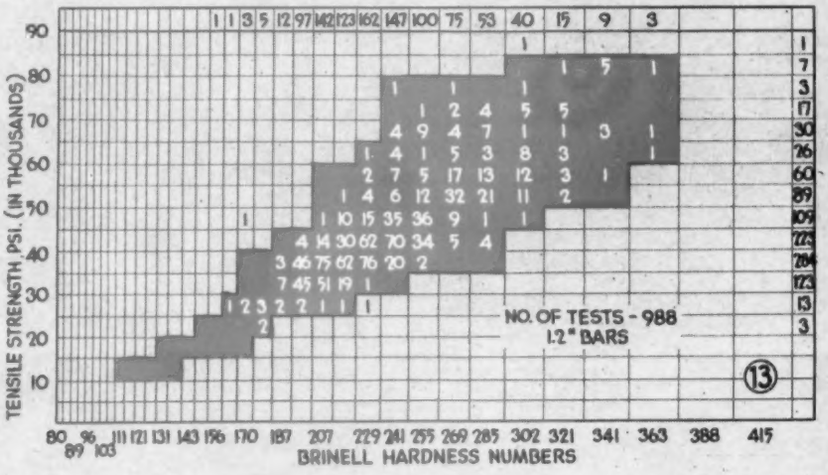
There is no a priori reason to assume that the brinell-tensile relation would change with section size, but the sizes were plotted separately to be sure. The results are shown in Figs. 4, 12, 13 and 14. There is no difference to the eye (no calculations were made) except in the case of the 2-in. bars, but this is not due to a section effect but to a large number of bars verging on (if not actually in) the martensitic condition and usually heavy in manganese and/or molybdenum.

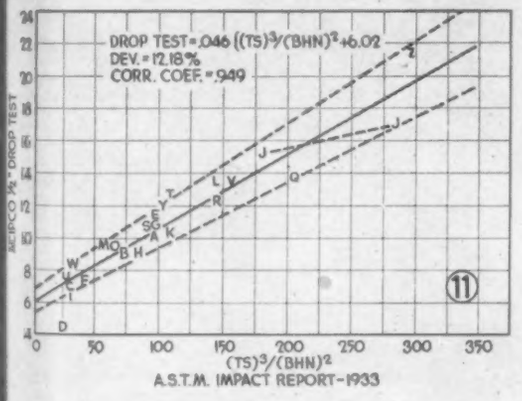
A study was made of the elements Ni, Cr, Cu, Mo, Mn, and P. Some hundred heats of white irons were examined and all fell in the lower right of the diagram completely out of the Field. Irons with over 2 per cent Cu, 3 per cent Ni, and 1 per cent P were invariably on the low side unless well balanced or heavily inoculated. A study was made of inoculated and untreated irons. A strong tendency from inoculation toward the upper side of the diagram was noticeable; the results from one foundry were especially good and are shown in Fig. 5, though some other

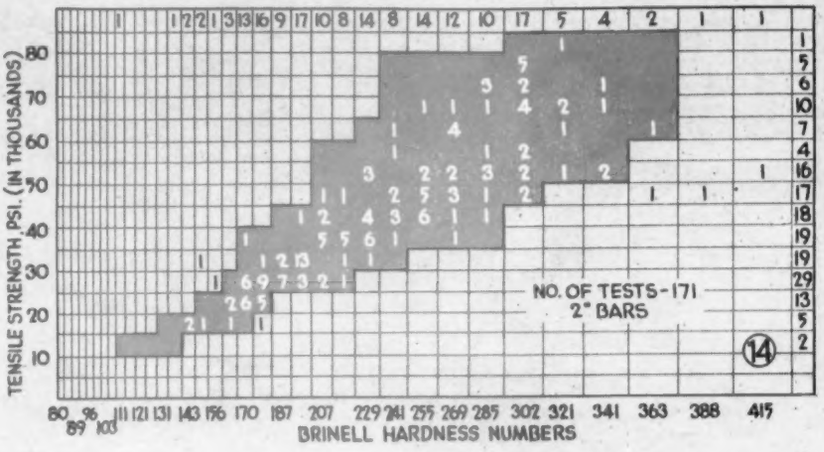












inoculated irons were fairly close to the average for all groups. These were also low phosphorus and low alloy irons. T. E. Barlow and C. H. Lorig's results when plotted on the Field show on the high side for the graphitizing inoculant, down the middle for the stabilizing type, and decidedly on the low side for the untreated irons (Results of Barlow and Lorig—"Gray Cast Iron Tensile Strength, Brinell Hardness and Composition Relationships," *American Foundryman*, September, 1945, are not a part of the data in Fig. 1).

Brinell and Bending Strength—In addition to the previous investigation the author also was requested to examine the available data for other correlation with brinell hardness number and more especially those applying to the transverse test.

In the bars that were submitted for examination there were 1023 with accompanying transverse data as well as information on tensile and brinell properties. The vari-

Brinell Hardness of GRAY CAST IRON

ous bars submitted were made up of the following various sizes:

—Bar Dimensions— Diam. in.	Span in.	Span/Depth	Number of Tests
0.875	12	14	81
1.20	18	15	745
2.0	24	12	158
3.0	24	8	39

Since the tensile-brinell relation already was established satisfactorily it was only necessary to determine the ratio of transverse strength to either one, and the most convenient seemed to be the tensile, since the units could be expressed as unit stress in each case. Fig. 6 shows the data for the 1.20-in. bar (B) in detail with the best straight line by least squares and the standard error drawn in. Fig. 7 shows the lines for all sizes, from which it is obvious that the tensile increases faster per unit of transverse stress the smaller the bar. The sudden change in slope from the 2-in. to the 3-in. (*Please turn to page* 191)

Table IV—Relation of Impact Properties to Various Tens/bhn Ratios

Drop Test vs	Equation Constants* m	b	Standard Error	Correlation Coefficient
Tens/bhn	.105	6.7	12.4	.929
Tens²/bhn	.112	4.4	11.9	.943
Tens³/bhn³	.046	6.0	12.2	.949
Pendulum Impact vs				
Tens/bhn	.305	4.6	24.17	.847
Tens²/bhn	.629	19.7	19.15	.827
Tens³/bhn³	.265	27.7	20.17	.877

Data from the 1933 Impact Report
Drop Test—1.20-in. diam. 6-in. Span, ½-in. Increment, 25 lb Hammer
Pendulum—Charpy type, 1.20-in. diam., 18-in. Span
*Equation—$Tens^x/bhn^y = m$ (Drop or Pendulum) + b

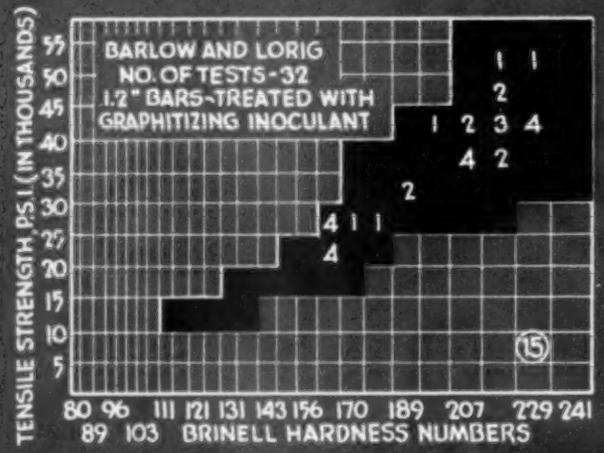
Table V—Drop Test vs Tens/bhn Ratios

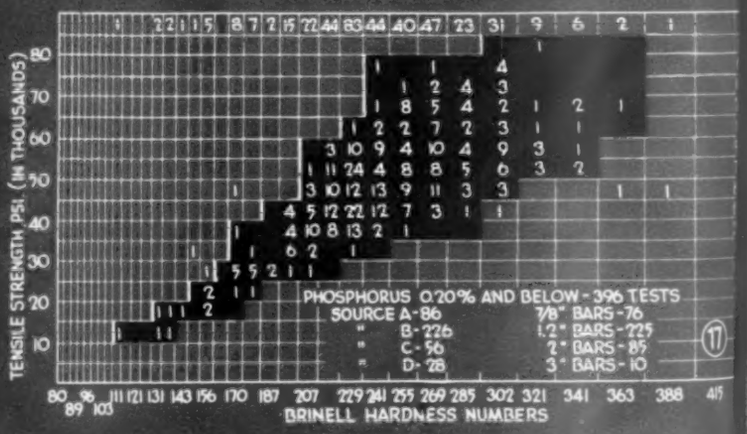
Ratio	Equation Constants m	b	Standard Error	Correlation Coefficient
Tens/bhn	5.24	127.0	9.9	.535
Tens²/bhn	6.35	12.7	23.8	.602
Tens³/bhn²	8.31	38.4	33.5	.401

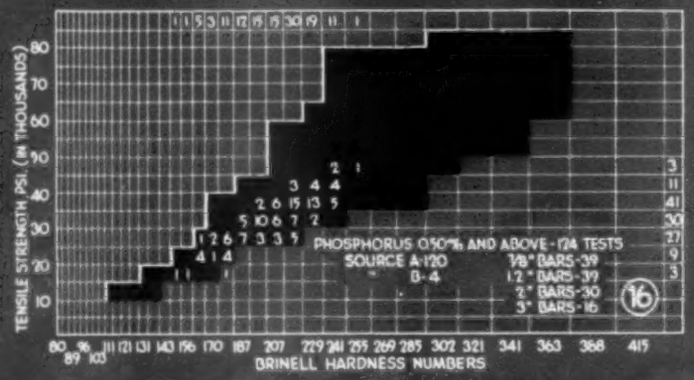
Bar C—2.0-in. diam., 12-in. span, 1-in. Increment, 50-lb Hammer

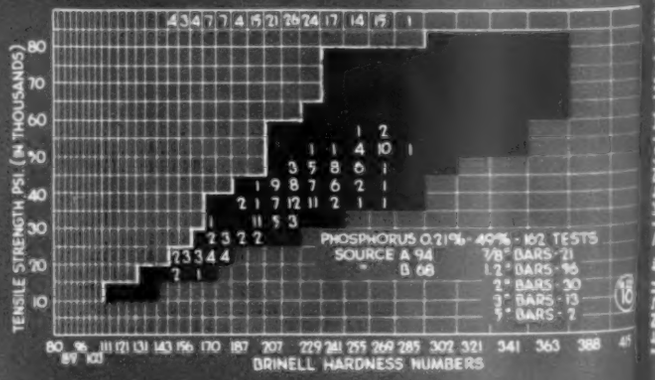
Ratio	Equation Constants m	b	Standard Error	Correlation Coefficient
Tens/bhn	4.51	90.6	9.7	.643
Tens²/bhn	4.46	−13.4	27.5	.674
Tens³/bhn³	8.15	−37.3	34.8	.602

Number of sets, 59 Bs, 54 Cs.
Each set average of three tensiles and from six ten ten drop tests.




PHOSPHORUS 0.20% AND BELOW - 396 TESTS
SOURCE A - 86
" B - 226
" C - 56
" D - 28
7/8" BARS - 76
1.2" BARS - 225
2" BARS - 85
3" BARS - 10
TENSILE STRENGTH, PSI. (IN THOUSANDS)
BRINELL HARDNESS NUMBERS
(17)


PHOSPHORUS 0.50% AND ABOVE - 124 TESTS
SOURCE A - 120
" B - 4
7/8" BARS - 39
1.2" BARS - 39
2" BARS - 30
3" BARS - 16
TENSILE STRENGTH, PSI. (IN THOUSANDS)
BRINELL HARDNESS NUMBERS
(16)



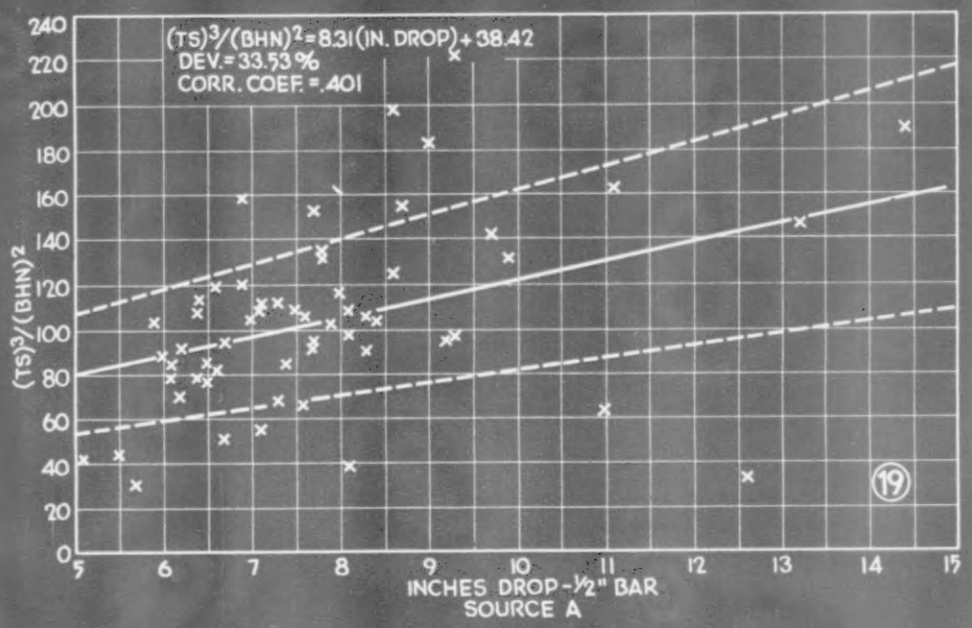


Fig. 15 — Data from bars treated with graphitizing inoculant

Fig. 16 — Results from irons containing 0.50 per cent and higher phosphorous

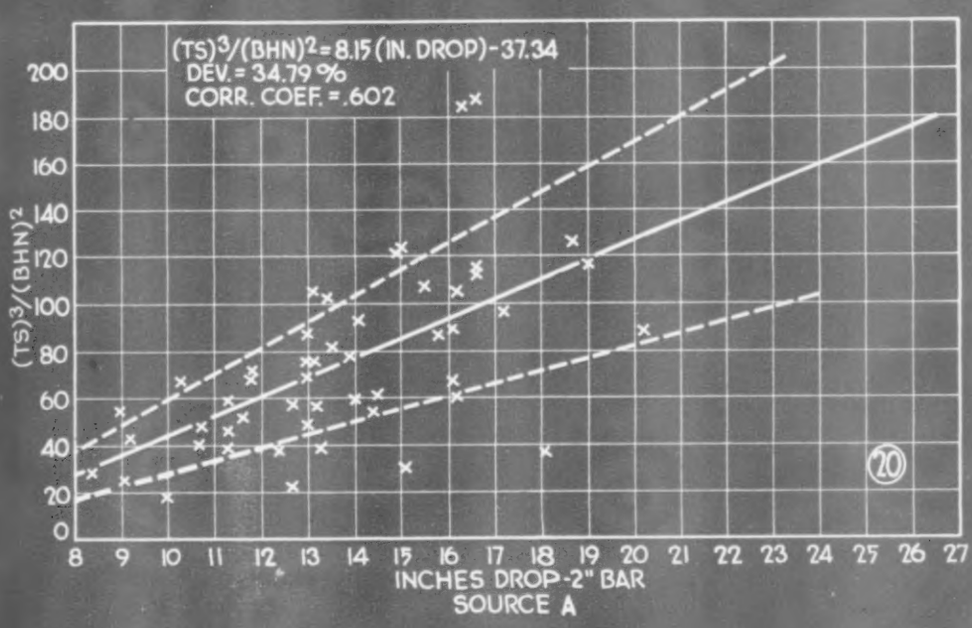
Fig. 17—Bars of 0.20 per cent and less phosphorus

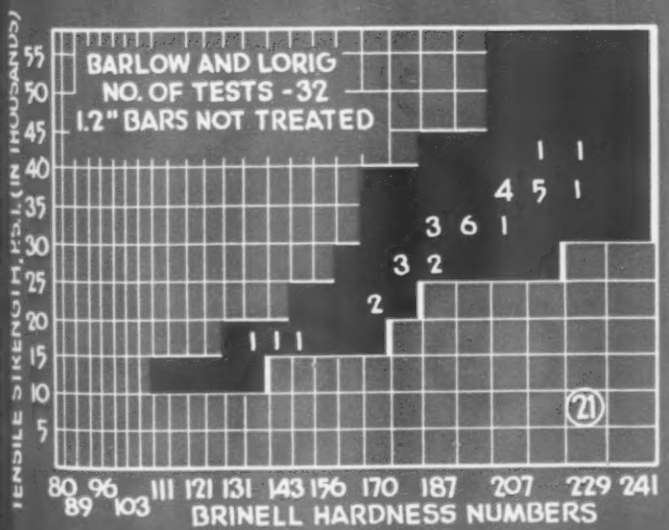
Fig. 18—Bars containing 0.21 to 0.49 per cent phosphorus

Figs. 19 and 20—Drop test vs tensile brinell. Height of drop varied from 5 to 15 in. on the 1.2-in. bar, 8 to 20 in. on the 2-in. bar

Fig. 21 Tensile-brinell data for 1.2-in. bars not treated

Fig 22 - Results from 1.2-in. bars treated with stabilizing inoculant





Correction of foundry

Where to look for waste in gray iron foundry operations is detailed in this paper originally presented before the Pittsburgh Foundrymen's Association. Until recently the author was technical advisor for the Gray Iron Founders' Society

UNTIL various of the handicaps under which foundries are operating today are corrected, production of gray iron castings will fall short of the industry's potential capacity. However, foundrymen can help this situation by making every casting they produce count—by reducing or eliminating the waste that occurs in everyday practice.

Waste is likely to occur in cupola operation, in coremaking, in molding, in shaking out, and in the processing of castings through cleaning, grinding, and shipment.

There has been endless discussion of cupola operation; nevertheless that subject must be covered to some extent, since down through the ages cupolas have been operated by trial and error methods. To a considerable degree they are operated that way today. Actually, the industry is in the transition period of reducing trial and error data to scientific principles.

In discussing the high spots of cupola operation in any foundry the importance of the size of the materials making up cupola fuel and metal charges should be emphasized. Even of greater importance is the accurate weighing of all the fuel and metal charges.

For instance, should a cylinder block iron of 3.35 per cent total carbon be made, and the cupola charge is in the ratio of 250 lb of coke per ton of metal, it will be noted that each ton of iron tapped from the cupola contains 67 lb of carbon. This ton of iron, however, was exposed to 225 lb of carbon (coke × 0.9) in the melting operation.

Coke serves two functions in the cupola melting process. The cupola is a carburizing melting operation in that the carbon content of the cupola product is higher than the carbon content of the charge. When striving for 3.35 per cent total carbon cylinder block iron, the cupola charge contains 2.75 per cent total carbon when the cupolas are operated at a high melting rate and 2.55 per cent when the cupolas are operated at a low melting rate. The carburizing effect is 0.6 per cent carbon and 0.8 per cent carbon, respectively, which is equivalent to 12 and 16 lb of carbon or 13.3 and 17.8 lb of coke per ton of iron melted.

As the desired carbon content of the cupola product progressively decreases from the 3.35 per cent total carbon level toward the 2.0 per cent total carbon or lower level, the carburizing effect of the cupola increases in potency. For example, at the Saginaw malleable plant the cupola charge contains about 1.45 per cent carbon while the product contains about 2.65 per cent carbon, an increase of 1.2 per cent carbon, the equivalent to 24 lb of carbon or 26.7 lb of coke per ton of iron melted.

Absolute accuracy in the weighing of all the components of the cupola fuel and

waste

Carelessness in any one of many operations eventually is reflected in the number and quality of castings reaching the inspection department

metal charge is of utmost importance. The overall gray iron foundry industry does not do a good job in weighing; in fact, it is unusual to find a foundry which is doing a weighing job equal to the quality of the materials it desires to produce. If cupola charge materials were weighed with the same accuracy used in weighing *gold*, the proper mental approach to weighing operations would be acquired and the benefits that accrue from this control recognized.

Coke should be of uniform particle size and coke particles might well be of the order of 1.5 lb each. The use of whole cylinder blocks, large steel bundles or other massive scrap should be avoided. The maximum diagonal of a steel bundle or broken cylinder block should not exceed 0.3 of the cupola diameter. For a 72-in. ID cupola this dimension would be 21.6 in. A steel bundle or broken cylinder block having dimensions of 13.75 x 13.75 x 13.75 in. has a (*Please turn to page* 168)

By A. J. EDGAR
Works Manager
Benton Harbor Malleable Industries
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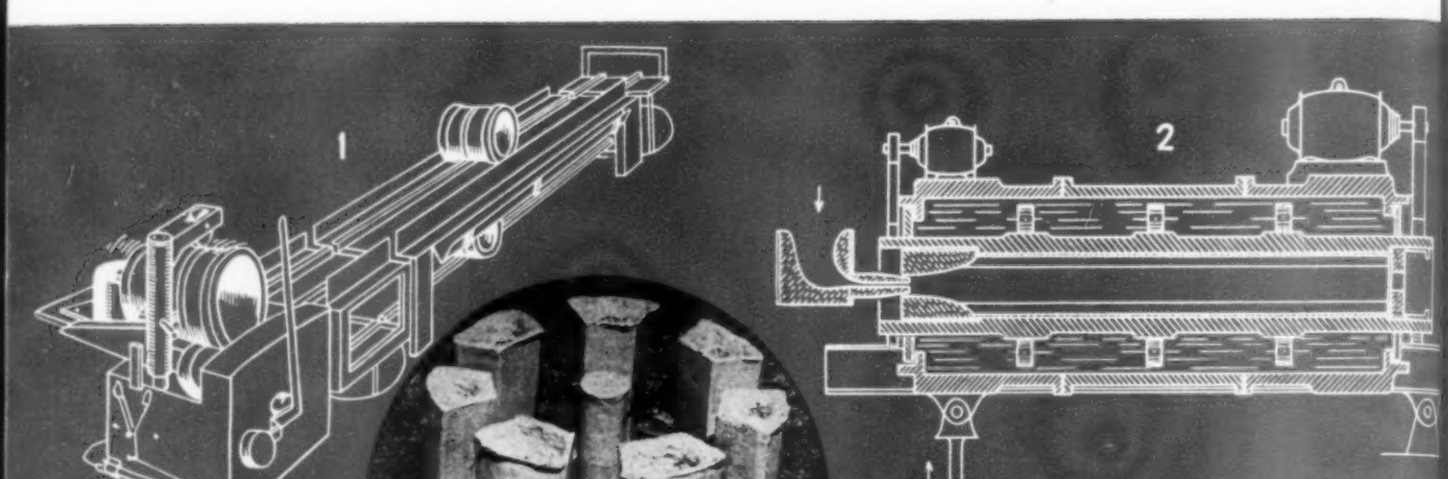


Centrifugal IN WARTIME GERMANY

Use of sand liners and water-cooled molds were among the principal German wartime developments in centrifugal casting of steel. This article is based on a report to the Technical Industrial Intelligence Committee

By CHARLES W. BRIGGS
Technical and Research Director
Steel Founders' Society of America

CAST-TO-SHAPE steel structures were produced centrifugally by a number of methods during the war by the German steel industry. From a tonnage standpoint the most important items produced were gun barrels, tubes, aircraft and automotive cylinders, and wheel-shaped castings of various types.

The methods used in producing the centrifugal castings were true centrifugal and semicentrifugal casting. However, only a relatively few castings were produced by centrifugal pressure casting methods. Both horizontal spindle and vertical spindle machines were used, but the largest tonnage of castings was produced on the horizontal spindle machines.

There were two distinctive developments to be found in Germany, neither of which was used in the United States. Both of these were employed in the production of guns. The most interesting of the two was the horizontal spindle machine developed by Dr. Poltzguter of the Werke Hochfrequenz Tiegelstahl Division, Deutsche Edelstahlwerke A. G. located in Bochum, Germany.

Use of Sand Liners—The Deutsche Edelstahlwerke at Bochum was well known throughout Germany for the production of high grade centrifugal casting of high alloy tubes. The centrifugal casting machines used by this company had been developed over a number of years by Dr. Poltzguter.

In 1928 Dr. Poltzguter began his experiments with the centrifugal casting of ferrous metals and successfully produced gray iron pipe in water-cooled molds operating on a horizontal spindle. Shortly thereafter an attempt was made to cast steel pipe in similar water-cooled molds. Poor results were obtained as the extreme chilling action of the water-cooled metal mold produced hot tears and cold cracks in the pipe. Since the chilling action was too intensive other experiments were made wherein use was made of heavy-walled iron molds, instead of water-cooled molds. This procedure proved unsatisfactory from a production viewpoint as cooling of the tubes was not sufficiently fast. Some small degree of success was obtained in the static casting of tubes by the use of water-cooled copper molds. The copper molds did not lend themselves to the centrifugal casting method because of their

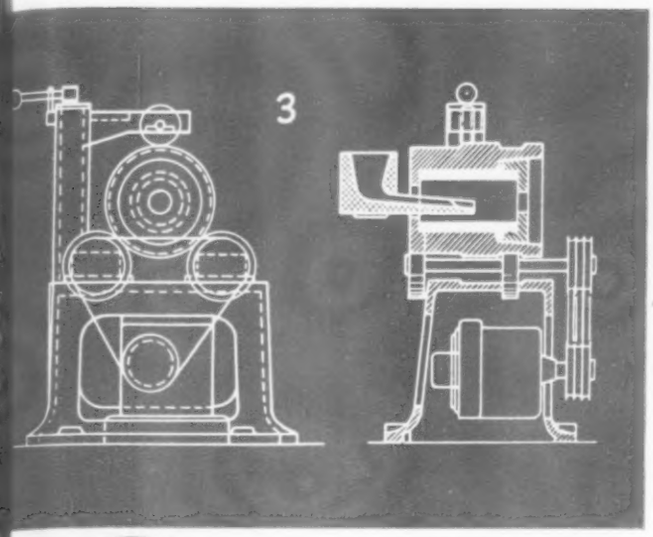


Fig. 1—Sketch of horizontal centrifugal casting machine and mold conveyor system for casting cylinder liners

Fig. 2—Mold of this horizontal machine is water cooled and lined with sand. Germans used the machine for casting tubes and guns

Fig. 3—Additional views of machine for casting cylinder liners. A metal mold, air cooled, was employed

Fig. 4—Tank wheel cast statically. Weight 340 lb

Fig. 5—Tank wheel cast centrifugally on vertical-spindle machine with cement sand mold. Weight 180 lb

Casting of Steel

high cost and, since copper is a soft metal, wear resulting from the copper mold rolling on steel rolls was high and the resultant mold life was low.

Further experiments with alloyed steel molds, water cooled, proved that sound tube castings could be produced centrifugally up to 250 mm (9.84 in.) outside diameter with 10 mm (0.394 in.) wall thicknesses of a length of 500 mm (19.7 in.). If the 500-mm length was exceeded, rejections increased considerably. The most serious trouble was that the steel froze to the mold, making it extremely difficult to remove the tube and at the same time lowering the life of the mold materially.

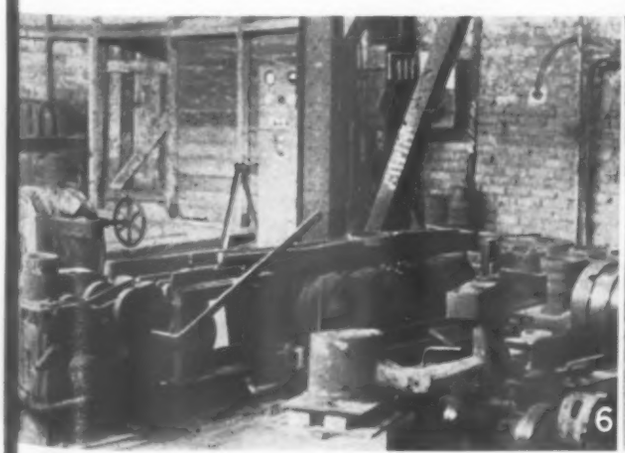
The goal of the company management was to produce tubes of 3 m (9.84 ft) in length. Several methods were attempted to overcome the troubles arising from the freezing of the steel to the mold. Studies consisted of (1) increasing the revolutions of the mold; (2) controlling the temperature of the cooling water; (3) varying the thicknesses of the mold walls and (4) changing the shape of the casting spout. These experiments were both time consuming and expensive as they often damaged a mold so that it could no longer be used. Studies proved that hot tears were formed in the tubes by increasing the revolving speed or by increasing the speed of water cooling.

Experiments in lining the mold with chamotte (a graded and bonded calcined aluminous clay) were then made. The chamotte lining was rammed with a minimum amount of water to a thickness of approximately 30 mm (1.18 in.). Tubes produced in such molds did not crack, but the chamotte stuck to the tubes and much trouble was experienced in removing the tubes from the mold and in cleaning them.

The next development was the (*Please turn to page* 255)

Fig. 6—Cylinder line centrifugal cast machine at Ruhrstahl Annener Gusstahlwerke

Fig. 7—Pouring spout and pouring basin swing away from the mold rotating position



The author discusses various theories for occurrence of microporosity in magnesium castings and suggests means for minimizing the condition. A succeeding article will describe impregnation methods for sealing castings

By HERBERT DOBKIN
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CERTAIN commercial magnesium alloy castings, particularly those which contain zinc as one of the alloying elements, are prone to a type of defect known as microporosity. The porous areas consist of interdendritic cavities, that is, voids between the grains of the material, and they may be found in castings of the simplest design. The porosity is not visible to the naked eye and is often not detectable by x-ray inspection, unless present in appreciable amounts. If present in small, widely segregated areas, microporosity does not affect the strength of the alloy. The strength is impaired by porosity only in large concentrated amounts. Microporosity can even be segregated to low stressed areas of the casting by proper foundry technique, so that decreased strength is not an objection to its presence.

The principal objection to this type of defect is the fact that even small amounts may cause leakage in parts which must withstand pressure in service, such as oil passages, oil manifolds, pump housings, compressor castings, etc. Most material specifications, particularly aircraft standards, are very strict in regard to pressure tightness in such parts, and parts which fulfill specification requirements in every other respect may be rejected on the basis of such leakage.

Figs. 1, 2, and 3 show x-ray views of typical examples of microporosity in magnesium alloy castings, acceptance of which is based on pressure test according to an Army Air Forces specification.[1] As can be seen, the x-ray does not show the individual holes, but clusters of holes or pores appear as vaguely outlined wavy lines or as darkened areas relative to the sound metal. Figs. 4 and 5[2, 3] show photomicrographs taken in regions of magnesium alloy castings which were found to contain microporosity; these show clearly the sharp, angular, interdendritic cavities, generally .001-.005 in. long, which are typical of this defect.

An example of microporosity in amounts undetectable by x-ray but sufficient to cause leakage is shown in Figs. 6 and 7. These figures show sections of an oil manifold on which the author has made tests and which was found to leak on pressure test. As can be seen, no defects are visible in these radiographs. Figs. 8 and 9, show photo-

Fig. 1—Radiograph showing microporosity (also crack) in a magnesium alloy sand casting

Fig. 2—Microporosity in a magnesium alloy permanent mold casting. Rejections of castings containing similar defects are based on pressure test

Fig. 3—Another x-ray view of microporosity in a magnesium alloy sand casting

micrographs of these same sections and reveal the small amount of microporosity which caused the leakage.

Magnesium alloys containing zinc are most prone to the formation of microporosity. As indicated in Table I,[4] however, the most popular types of magnesium sand and die casting alloys contain a certain percentage of this alloy. Zinc is added to commercial magnesium alloys, in conjunction with aluminum and small amounts of manganese, and these alloys have about the best physical properties of any magnesium casting alloys. Zinc is essential, because even in small amounts it improves the corrosion resistance of these alloys many times.

Microporosity is interesting from a metallurgical point of view, since the exact reasons for its occurrence are not known. Several theories have been proposed[3, 5] each of which has its proponents, and each of which helps partially to explain the phenomenon. The truth is probably a combination of each of these theories.

The first theory holds that microporosity is caused by microshrinkage, due to the failure to feed adequately the casting during the final stages of solidification. If lack of proper feeding were the only cause for microporosity, then it should be possible to eliminate it fairly readily by proper casting design and by improved foundry technique as regards the placing of gates, chills, and risers. While it is true that microporosity can be minimized by such practices, it is nevertheless impossible to eliminate it entirely. In fact, microporosity often appears at or near risers, and may even be increased by increasing the size of the risers.

Proponents of the *lack-of-feeding* theory[3, 8] explain that the greater volume of metal flow caused by the larger risers produces heating of the mold walls, which in turn prevents freezing of the metal in those areas until after the adjoining sections have solidified. It is claimed that microporosity is then caused by the contraction in volume of the liquid which solidifies last, which leaves voids that can no longer be fed.

In order to accept this theory the significance of the term feeding, as ordinarily used in the foundry, must be expanded considerably. The term must be considered not only in its macroscopic sense but in its microscopic sense as well, and it must indicate that the last portion of the melt to solidify (the Al-Zn rich portion of approximately eutectic composition in the Mg-Al-Zn alloys) has failed to feed into the shrinkage cavities around the primary alpha magnesium dendrites.

In order to explain more fully the meaning of the last statement, and in order to explain better the other theories of microporosity, it would probably be best to digress from the general discussion of the subject for a moment, and study the phase diagram of the Mg-Al-Zn system. Since the ternary equilibrium diagram for magnesium alloys of aluminum and zinc has not been completely established as yet, the ternary system can probably best be explained by a study of the well known binary system of aluminum in magnesium.

Fig. 10 shows the constitutional diagram for the mag-

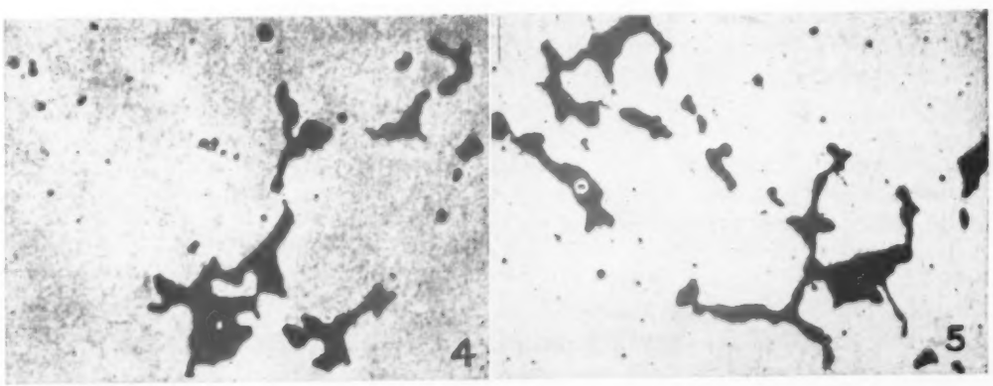


Fig. 4 — Micrograph showing microporosity in a magnesium alloy sand casting. Unetched. 100X.

Fig. 5 — Microporosity disclosed in micrograph of cast Dowmetal H Alloy. Unetched, 100X

nesium end of the Mg-Al system, and includes the range of all commercial aluminum alloys of magnesium. As can be seen, a eutectic is formed at 819 F and 32.2 per cent Al, and the aluminum exhibits decreasing solid solubility with decreasing temperature. The primary constituent formed is a solid solution called α (Mg), while the secondary constituent is designated as β (Mg-Al).

In expanding this system to include zinc, it need only be remembered that zinc is added to commercial alloys only in small enough quantities to be completely soluble in the primary Mg and secondary Mg-Al constituents. Therefore, the zinc appears in solid solution as α (Mg)-Al-Zn and as β (Mg-Al)-Zn.

On cooling from the melt, the alpha constituent precipitates out first at the higher temperatures, leaving the melt progressively richer in the beta Al-Zn constituent. As the temperature is lowered further, and more and more alpha constituent is precipitated, the remaining beta constituent approaches closer and closer to eutectic composition, and finally solidifies at the lowest eutectic temperature. Since zinc has the lowest melting point, it becomes increasingly concentrated in the freezing liquid, so that the last portions to solidify have a relatively high zinc content. The zinc finally becomes concentrated in the beta constituent. This last portion of the melt is the one which, it is claimed, has failed to feed into the shrinkage cavities around the primary α (Mg) dendrites which were formed due to the volume contraction of the eutectic when transforming from liquid to solid.

Wide Range Solidification Causes Shrinkage

The reason that the last portion of the melt solidifies around the primary alpha magnesium dendrites, thus forming shrinkage cavities in those regions, is a phenomenon called *coring* which is familiar in certain aluminum and magnesium alloys, and in fact in any alloys in which solidification from the melt occurs over a wide range of temperature. Because of the width of the solidification range in such alloys, the alpha constituent precipitates out first on cooling. The beta constituent of approximately eutectic composition, which precipitates out last on cooling to the lower eutectic temperature, then solidifies as a shell around the alpha constituent. The microstructure thus consists of a core of alpha constituent surrounded by a shell of beta constituent.

This phenomenon occurs in some aluminum alloys exactly as described. Although the constitution diagram of Fig. 10 indicates that the same thing should occur for these magnesium alloys, coring actually occurs in a slightly different fashion in those cases. The last portion of the melt to solidify, the β (Mg-Al)-Zn constituent, actually forms as massive irregular crystals between the grains of the material which solidified first. The effect is the same as in the aluminum alloys, however, in that the final solidification and contraction of volume occurs between the original dendrites.

With this brief digression out of the way, it is now possible to return to the original discussion of the theories for the occurrence of microporosity in magnesium alloy castings.

A second theory is that microporosity is caused by the difference in solid solubility of the dissolved constituents at various temperatures. Since solid solubility of the alloying constituents is an inherent characteristic, any defects occasioned by it are difficult to overcome. However, it is claimed that the porosity can be minimized, although not completely eliminated, by proper foundry technique. Proper foundry technique in this case implies the most advantageous arrangement of chills, gates and risers in order to produce progressive solidification, beginning, theoretically, at a point farthest from the gate

The third, and probably most widely accepted theory, is that microporosity is caused by tearing along the interface of the alpha solid solution and the interdendritic beta constituent. This tearing occurs due to the inability of the beta constituent to withstand the tension stresses set up by the contraction of the solid metal on cooling after the liquid to metal solidification has been completed.

Actually, shrinkage occurs because of three types of contraction during the cooling of any molten metal. The first type of contraction occurs in the liquid itself as it cools. The second occurs during the process of solidification, and the third occurs due to the normal contraction of the solid metal as it cools.

If the casting is large, or if the solidification range is wide, as discussed previously, or if the completion of solidification is prolonged for any other reason, steep temperature gradients are produced from one section of the casting to the other. The normal contraction of the metal, plus the temperature gradients, set up tension stresses which are resisted by the strength of the metal at the temperature. Strong alloys, such as ferrous alloys, can resist tearing resulting from these stresses, but weaker alloys such as magnesium alloys are not strong enough, and tearing occurs. It is felt that most cracks occur as the metal cools after solidification from the liquid, since any cracks which occur during cooling from the liquid to the solid could heal themselves while the material is still in a pasty condition.

Tearing occurring during the normal contraction of the metal on cooling after (*Please turn to page* 178)

TABLE I—Nominal Compositions of Three Popular Commercial Magnesium Casting Alloys Containing Zinc

Alloy	Use	Nominal Composition Al	Mn (Min.)	Zn
Dowmetal C	Sand and Permanent Mold Castings	8.3 to 9.7	0.10	1.7 to 2.3
Dowmetal H	Sand and Permanent Mold Castings	5.3 to 6.7	0.15	2.5 to 3.5
Dowmetal R	Die Castings	8.3 to 9.7	0.13	0.4 to 1.0

Figs. 6 and 7—Sections of magnesium alloy sand casting which leaked on pressure test but which show no defects under x-ray.

Fig. 8—Micrograph of section shown in Fig. 6, showing tiny microporosity which caused leakage. Unetched 100X

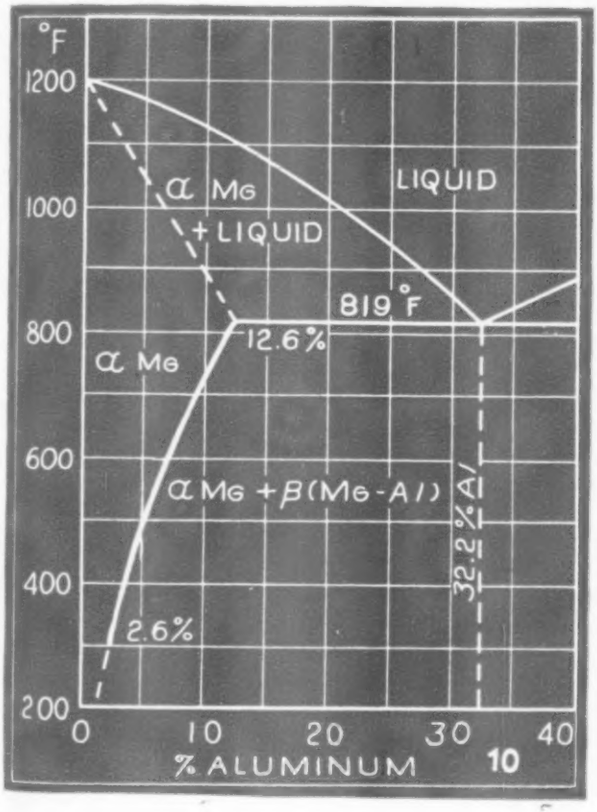
Fig. 9—Micrograph of section shown in Fig. 7 discloses microporosity. Unetched, 100X

Fig. 10—Aluminum end of Mg-Al constitutional diagram

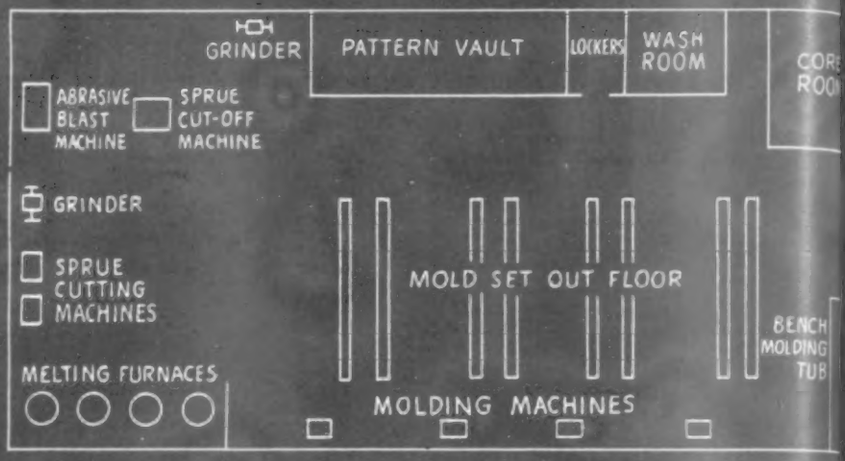
TABLE II—Effect of Microporosity on Mechanical Properties of Magnesium Alloy Castings

Alloy	Condition	Degree of Porosity*	Yield Strength psi	Tensile Strength psi	Elongation %
Dow H	As Cast	None	14,000	27,000	5.0
		Light	13,700	25,500	4.0
		Fairly Heavy	12,900	23,600	2.0
		Very Heavy	11,900	18,400	1.0
	Solution Treated	None	14,000	39,000	12.0
		Light	13,600	37,500	6.5
		Fairly Heavy	13,200	26,300	4.5
		Very Heavy	11,800	20,500	2.0
Dow C	As Cast	None	16,000	24,000	2.0
		Light	14,600	19,000	0 5
		Fairly Heavy	13,700	17,700	0.5
		Very Heavy	12,900	16,000	0.5
	Solution Treated	None	16,000	39,000	10.0
		Light	14,600	29,300	3.5
		Fairly Heavy	15,000	25,000	2.0
		Very Heavy	13,700	18,700	1.5

*See text for definitions of terms.



SMALL BRASS FOUNDRY



Operated on Third Floor

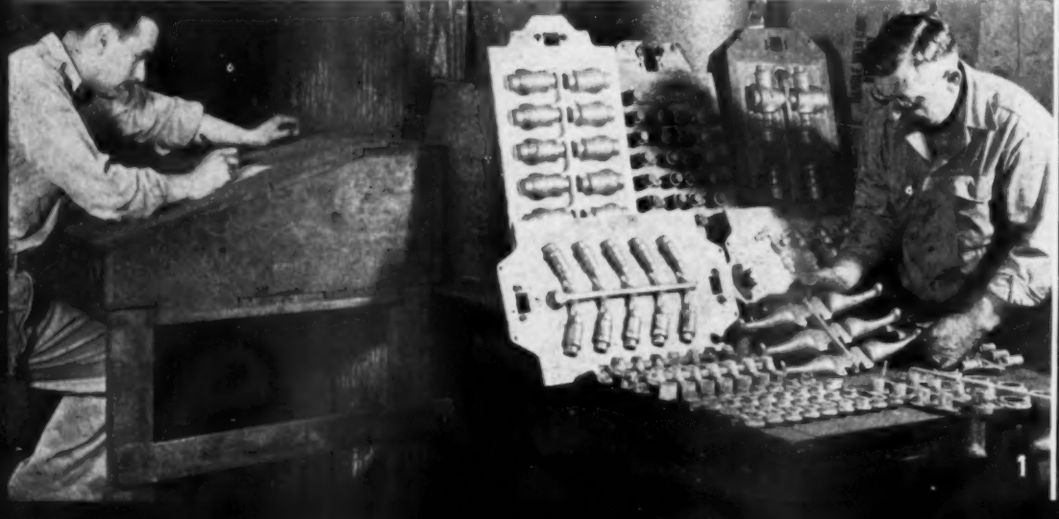
By EDWIN BREMER
Metallurgical Editor
THE FOUNDRY

ATLANTIC Brass Work Inc., Chicago, operating a small foundry for the production of small and medium weight brass castings, differs somewhat from the usual foundry in that it is located on the top floor of a three-story building. While a large proportion of castings made by the firm are used in its line of coffee urns, restaurant equipment, beer dispensing units, etc., many jobbing castings also are produced. Remaining two floors and part of the basement of the building in which the foundry is located are devoted to machining, plating and polishing, fabrication, and assembly departments for preparation of the finished products.

Building is constructed of brick and is 50 x 100 ft with steel sash on three sides. The foundry area is of similar dimensions, and to provide additional illumination when required, fluorescent lighting has been installad. Floor of the foundry is brick laid on tongue-and-groove wood with the following successive layers—heavy kraft paper, asbestos, sand and then the brick laid in an inter locking design. As indicated in the accompanying sketch the molding machines are located along one wall, and the mold set-out floors are located at right angles to the wall. The molding machines are of the jolt-squeeze type. Metal is melted in oil-fired crucible furnaces along the same wall as the molding machines, but near one end. Bench or tub molding for small or odd jobs is conducted at the opposite end of the building.

Location of other departments such as coreroom, pattern vault, and casting, finishing, and cleaning equipment also are indicated on the sketch. Pattern vault is constructed of hollow tile to make it fireproof. It is about 10 x 20 ft, and provides ample room for storage of all patterns. An overhead crane spanning approximately two-thirds of the width of the building is used for pouring and any heavy lifting.

Castings made by the firm include valves, cocks, faucets and numerous fittings as well as legs for its restaurant equipment, and many of these are shown in the accompanying illustrations. Jobbing castings produced in the foundry are along somewhat similar lines. Most of the castings are made from the 85-5-5-5 alloy, but the 88-10-2 alloy also is used (*Please turn to page* 242)



Left—Sketch of foundry layout of Atlantic Brass Works Inc., Chicago

Fig. 1—Patterns and castings shown here indicate some of the variety of parts produced in the foundry. Most castings are made from matchplate patterns

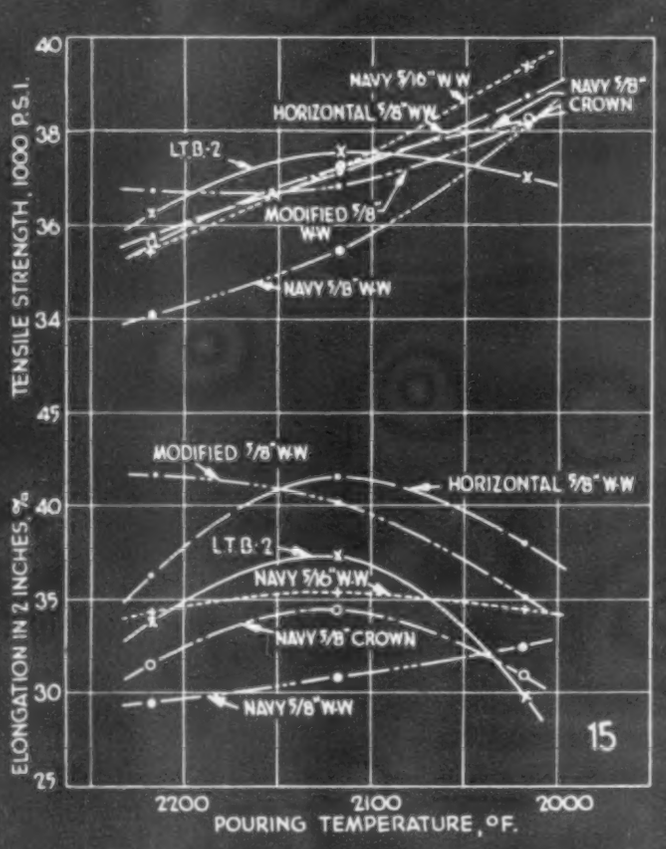
Fig. 2—Metal is melted in these oil-fired crucible furnaces. The 85-5-5-5 alloy is used for most castings

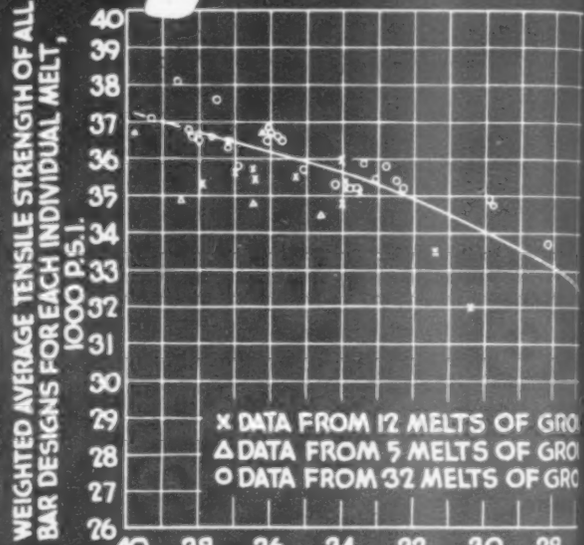
Fig. 3—Mold set-out floor, with completed molds placed on inclined racks for pouring. End of mold opposite sprue is elevated about 2 in.

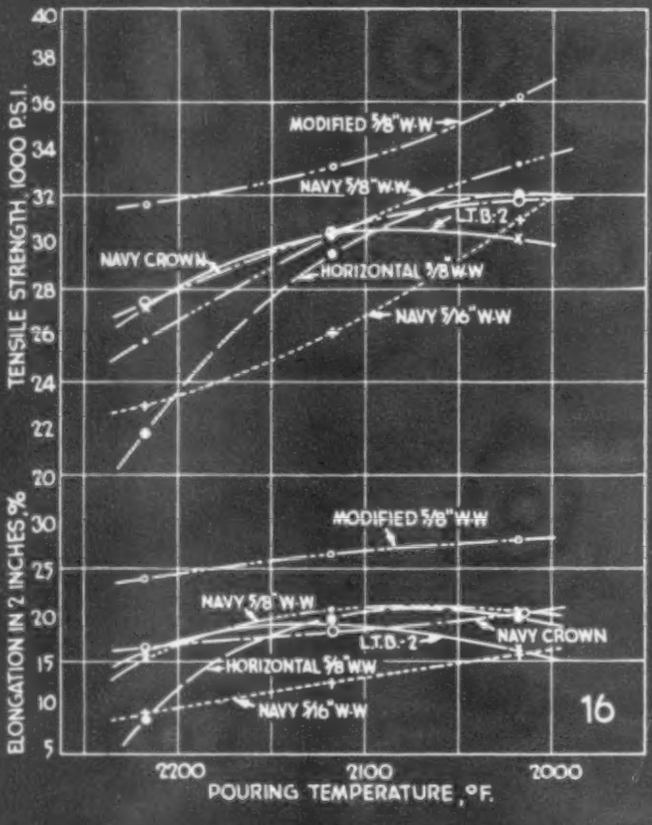
Fig. 4—Cleaning department where gates and risers are removed and gate stubs are ground

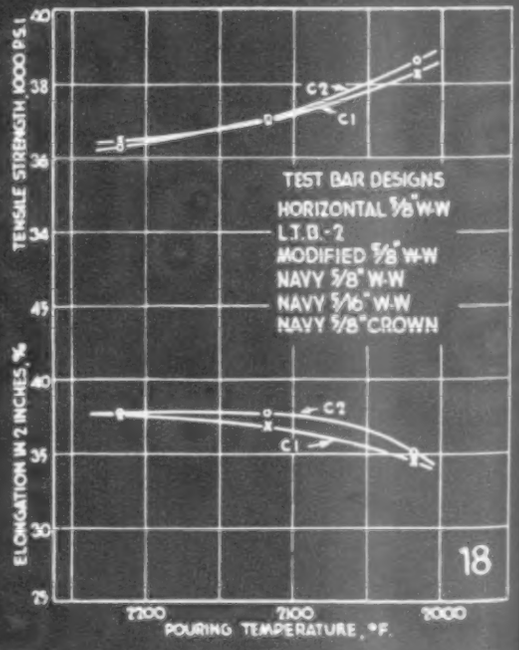
Fig. 5—Pouring molds. Inclined position of mold carries metal to end of runner and prevents turbulence as cavity gradually is filled

Test


TENSILE STRENGTH, 1000 P.S.I.
NAVY 5/16" W.W
HORIZONTAL 5/8" W.W
NAVY 5/8" CROWN
L.T.B.-2
MODIFIED 5/8" W.W
NAVY 5/8" W.W
ELONGATION IN 2 INCHES, %
MODIFIED 5/8" W.W
HORIZONTAL 5/8" W.W
L.T.B.-2
NAVY 5/16" W.W
NAVY 5/8" CROWN
NAVY 5/8" W.W
15
2200
2100
2000
POURING TEMPERATURE, °F.


WEIGHTED AVERAGE TENSILE STRENGTH OF ALL BAR DESIGNS FOR EACH INDIVIDUAL MELT, 1000 P.S.I.
× DATA FROM 12 MELTS OF GRO
△ DATA FROM 5 MELTS OF GRO
○ DATA FROM 32 MELTS OF GRO
WEIGHTED AVERAGE ELONGATION OF ALL

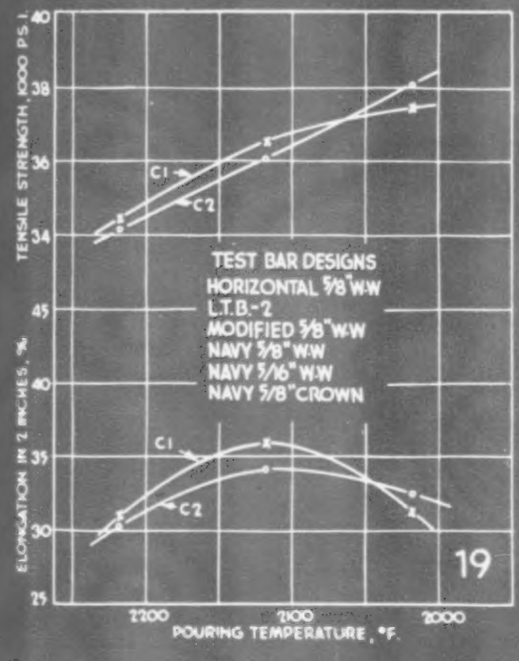

TENSILE STRENGTH, 1000 P.S.I.
MODIFIED 5/8" W.W
NAVY 5/8" W.W
L.T.B.-2
NAVY CROWN
HORIZONTAL 5/8" W.W
NAVY 5/16" W.W
ELONGATION IN 2 INCHES, %
MODIFIED 5/8" W.W
NAVY 5/8" W.W
NAVY CROWN
L.T.B.-2
HORIZONTAL 5/8" W.W
NAVY 5/16" W.W
16
2200
2100
2000
POURING TEMPERATURE, °F.


TENSILE STRENGTH, 1000 P.S.I.
C2
C1
TEST BAR DESIGNS
HORIZONTAL 5/8" W.W
L.T.B.-2
MODIFIED 5/8" W.W
NAVY 5/8" W.W
NAVY 5/16" W.W
NAVY 5/8" CROWN
ELONGATION IN 2 INCHES, %
C2
C1
18
2200
2100
2000
POURING TEMPERATURE, °F.

Bars FOR 85-5-5-5 ALLOY

This is the second and concluding article comprising the 1946 Foundation Lecture presented before the 50th Anniversary Convention of the American Foundrymen's Association

By G. H. CLAMER
President
Alox Metal Co., Philadelphia
Chairman
Metallurgists' Advisory Committee,
Non-Ferrous Ingot Metal Institute



THE effect of pouring temperature on the tensile properties of a test bar will depend upon the melt quality to a very considerable extent. Fig. 15 is a plot of the tensile properties against the pouring temperature. Paying particular attention to the properties obtained at the two highest pouring temperatures, the tensile properties of the various designs, in general, decrease in the following order: (1) Modified ⅝-in. web Webbert (2) Horizontal ⅝-in. web Webbert (3) L.T.B. (4) Navy 5/16-in. web Webbert (5) Navy ⅝-in. Crown (6) Navy ⅝-in. web Webbert. Increasing the web of the Navy bar from 5/16-in. to ⅝-in. greatly decreases the properties obtained. This is caused by the greatly increased amount of microporosity which accompanies the thicker web.

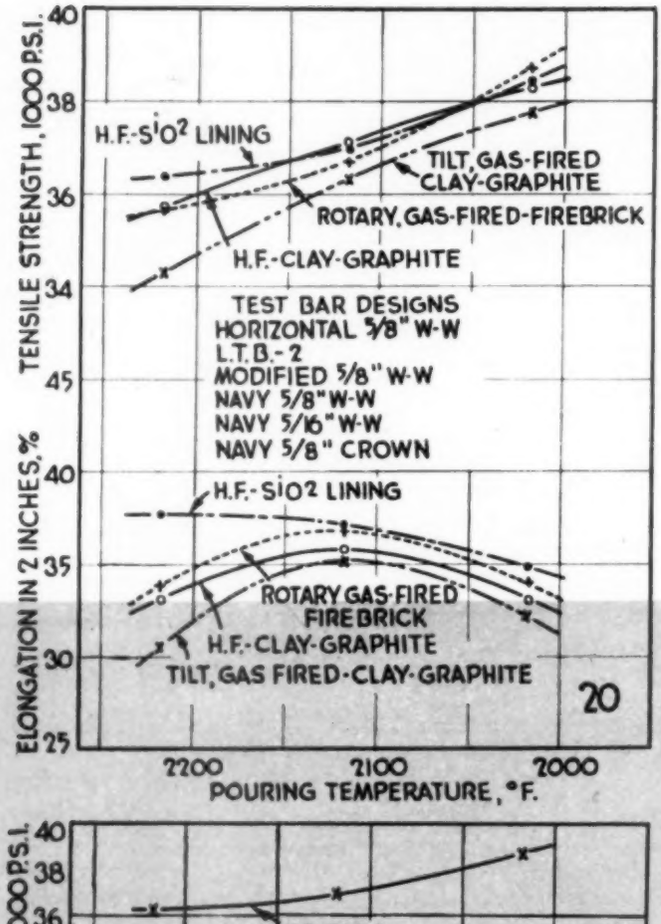
The data represented by this figure were obtained on 27 melts of high quality, and each point represents the average values from 54 different bars. Melts prepared under glass slag were excluded. In general, highest elongation values on most designs were obtained at an intermediate pouring temperature of about 2125 F. The Navy 5/16-in. web Webbert is least affected by pouring temperature. Fig. 16 shows the tensile properties versus pouring temperature for the same six test-bar designs poured from three melts of low quality made under a glass slag in a clay-graphite lined high-frequency induction furnace. Each point represents the average value of six test bars from three melts. All of the properties are low and they tend

Fig. 15—Effect of test-bar design on tensile properties of bars cast from high quality melts

Fig. 16—Effect of test-bar design on tensile properties of bars cast from poor quality melts

Fig. 17—Relationship between weighted average elongation and weighted average tensile strength of all test bar designs investigated

Figs. 18 and 19—Effect of charging method on average tensile properties of bars of all six designs. Melts made in high-frequency furnace with silica lining (Fig. 18), and in gas-fired tilt furnace with clay-graphite crucible (Fig. 19)



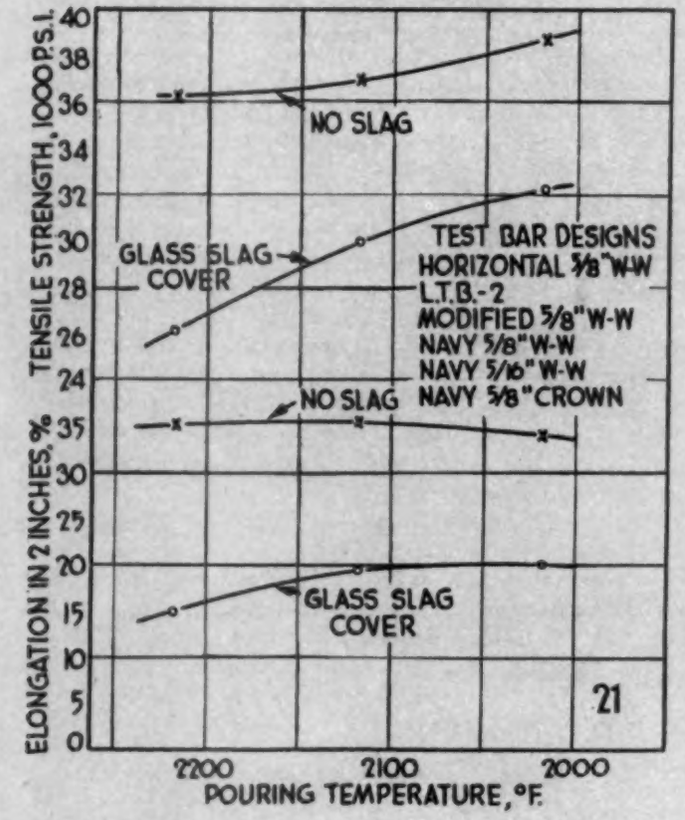


Fig. 20—Effect of furnace type and furnace lining on average tensile properties of all six designs

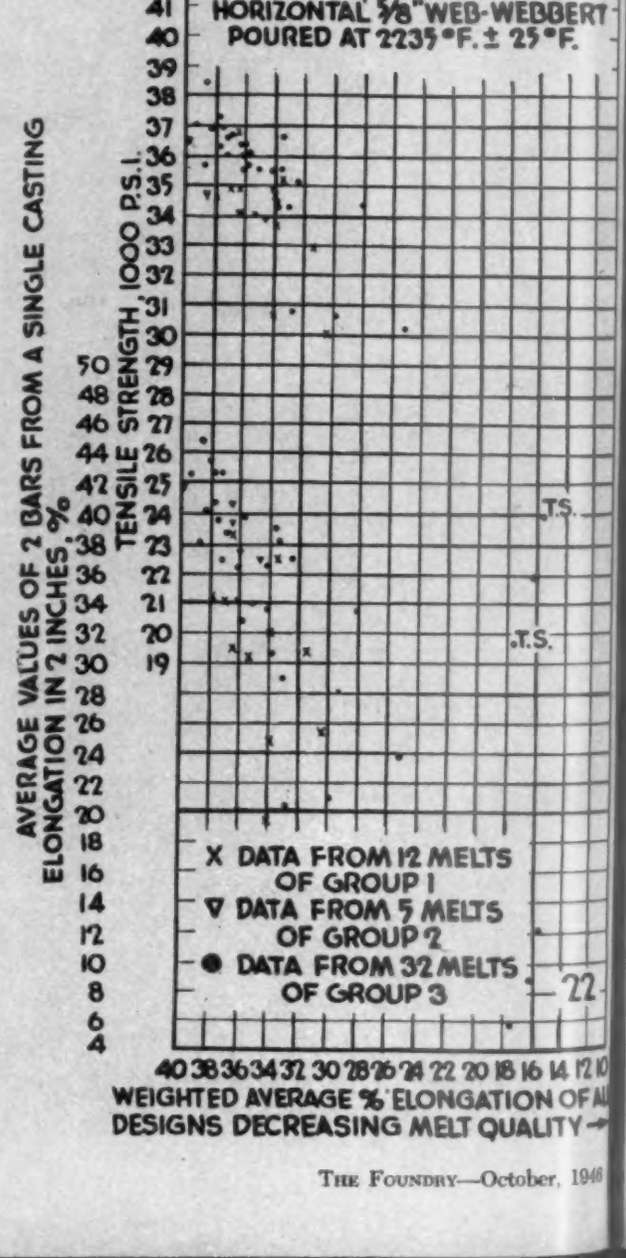
Fig. 21—Effect of a glass slag cover on average tensile properties of all six designs

Fig. 22 and 23—Average tensile properties of two test bars machined from the same casting; horizontal ⅝-in. web Webbert (Fig. 22), Navy 5/16-in. web Webbert (Fig. 23)
Fig. 24—Individual tensile properties of two test bars—Navy 5/16-in web Webbert—machined from the same casting

to increase with decreasing pouring temperature. There are two important points to note here.

The first is that the optimum pouring temperature for any given design will depend upon the melt quality. If the melt quality is low, the lowest pouring temperature produces the highest tensile strength and elongation properties. If the melt quality is high, the higher temperature range, in general, produces the highest elongation values in most designs while the tensile strength increases only slightly with decreasing pouring temperature. Intermediate melt qualities frequently show rather complex relationship between test-bar properties and pouring temperature. These complex relationships are caused by the combined effects of pouring temperature on lead distribution and soundness, as outlined previously. These two factors have opposite effects on test-bar properties.

The second important point is that the microporosity in Webbert-type bars and the small rounded pinholes in cast-


HORIZONTAL 5/8" WEB-WEBBERT
POURED AT 2235 °F. ± 25 °F.
AVERAGE VALUES OF 2 BARS FROM A SINGLE CASTING
ELONGATION IN 2 INCHES, %
TENSILE STRENGTH, 1000 P.S.I.
T.S.
T.S.
X DATA FROM 12 MELTS OF GROUP 1
▽ DATA FROM 5 MELTS OF GROUP 2
● DATA FROM 32 MELTS OF GROUP 3
22
WEIGHTED AVERAGE % ELONGATION OF ALL DESIGNS DECREASING MELT QUALITY →

to-shape bars are caused by the gas content of the melt, and are most pronounced at higher pouring temperatures. Therefore, melt quality is most accurately reflected by the test-bar properties when the test bars are poured at a temperature near 2220 F.

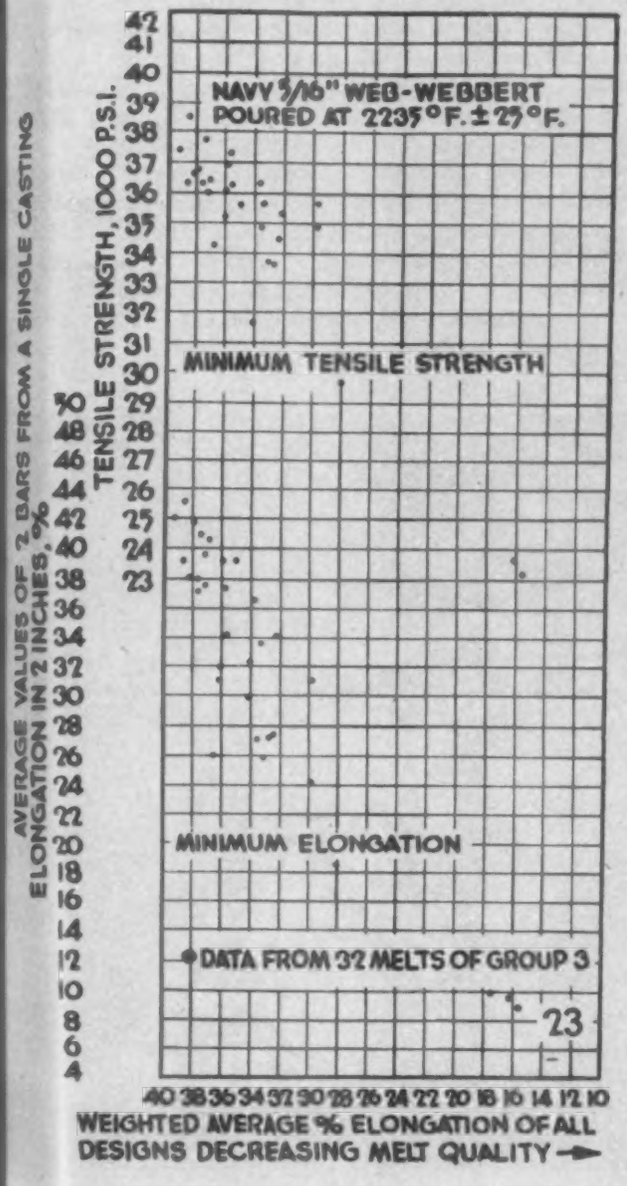
Variations in a number of foundry variables may introduce differences in tensile properties not attributable to differences in melt quality. The most common variables which may not be controlled properly are pouring temperature, height, speed, mold tilt and permeability, and moisture content of the sand. The effects of all of these variables were investigated and, of course, a great deal of information was obtained on the effect of pouring temperature which has already been described. In general, the effects of the other foundry variables may be summarized as follows:

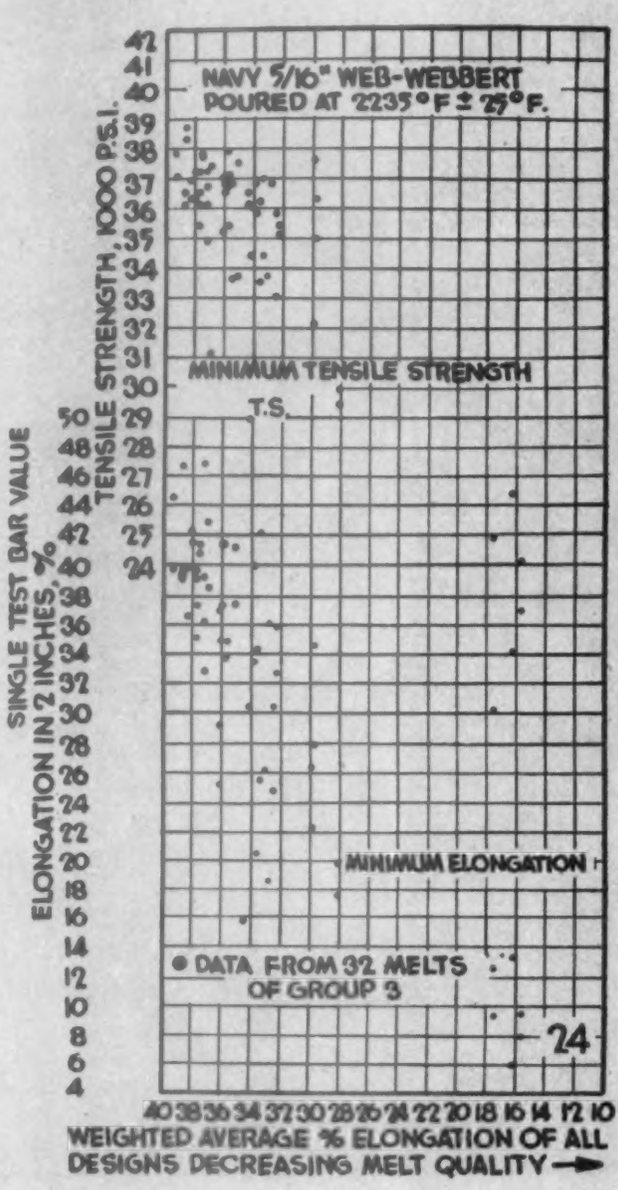
1. Wide variations in moisture content or in permeability of natural or synthetic sands have only very slight effects on the test-bar properties obtained in several of the different designs of test bars poured with 85-5-5-5 alloy. Because these effects were slight, it was concluded that gas absorption in the mold is not an important factor determining the tensile properties of test bars of 85-5-5-5 alloy.

2. The tensile properties of the horizontal ⅝-in. web Webbert test bar were adversely affected by the use of a synthetic sand, whereas the Navy keel-block casting was unaffected by the use of this type of sand, but the properties obtained on this design in both sands were rather poor.

3. It should not be concluded from these observations that wide variations in permeability or moisture content of the green sands would be acceptable in commercial operations.

4. At least during a period of high atmospheric humidity, poor test-bar properties were obtained from a high quality melt by pouring it from (*Please turn to page* 184)


NAVY 5/16" WEB-WEBBERT
POURED AT 2235° F. ± 25° F.
MINIMUM TENSILE STRENGTH
MINIMUM ELONGATION
DATA FROM 32 MELTS OF GROUP 3
23
AVERAGE VALUES OF 2 BARS FROM A SINGLE CASTING
ELONGATION IN 2 INCHES, %
TENSILE STRENGTH, 1000 P.S.I.
WEIGHTED AVERAGE % ELONGATION OF ALL DESIGNS DECREASING MELT QUALITY

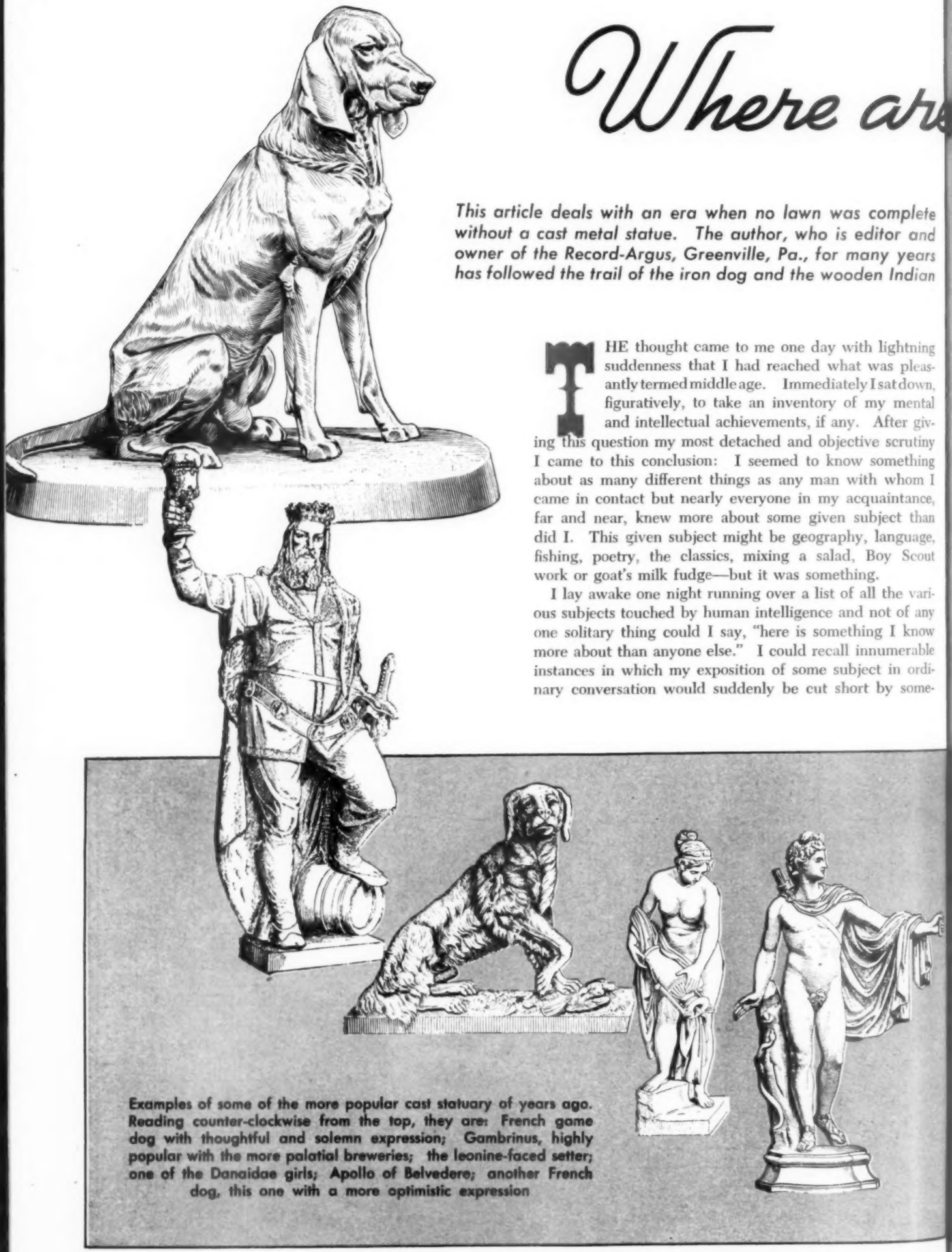

NAVY 5/16" WEB-WEBBERT
POURED AT 2235° F ± 25° F.
MINIMUM TENSILE STRENGTH
T.S.
MINIMUM ELONGATION
DATA FROM 32 MELTS OF GROUP 3
24
SINGLE TEST BAR VALUE
ELONGATION IN 2 INCHES, %
TENSILE STRENGTH, 1000 P.S.I.
WEIGHTED AVERAGE % ELONGATION OF ALL DESIGNS DECREASING MELT QUALITY

Where arth

This article deals with an era when no lawn was complete without a cast metal statue. The author, who is editor and owner of the Record-Argus, Greenville, Pa., for many years has followed the trail of the iron dog and the wooden Indian

THE thought came to me one day with lightning suddenness that I had reached what was pleasantly termed middle age. Immediately I sat down, figuratively, to take an inventory of my mental and intellectual achievements, if any. After giving this question my most detached and objective scrutiny I came to this conclusion: I seemed to know something about as many different things as any man with whom I came in contact but nearly everyone in my acquaintance, far and near, knew more about some given subject than did I. This given subject might be geography, language, fishing, poetry, the classics, mixing a salad, Boy Scout work or goat's milk fudge—but it was something.

I lay awake one night running over a list of all the various subjects touched by human intelligence and not of any one solitary thing could I say, "here is something I know more about than anyone else." I could recall innumerable instances in which my exposition of some subject in ordinary conversation would suddenly be cut short by some-



Examples of some of the more popular cast statuary of years ago. Reading counter-clockwise from the top, they are: French game dog with thoughtful and solemn expression; Gambrinus, highly popular with the more palatial breweries; the leonine-faced setter; one of the Danaidae girls; Apollo of Belvedere; another French dog, this one with a more optimistic expression

By JOHN L. MORRISON

...the Dogs of YESTERYEAR?

one presenting, ever so casually, such more thorough basic information that I was more confused than W. C. Fields mired in a noodle swamp.

One day the light broke. My subconscious mind suggested the subject of cigar store Indians. I worked on that with a will and within two years was acclaimed by press and public and even by one of the scientific question-and-answer bureaus to be the greatest authority on cigar store Indians in the wide world, which was wider then than it is today. With mingled pride and shame I admit having put in more research and burned more midnight oil than probably ever before had been devoted to a fool subject—barring perpetual motion or squaring the circle.

This would seem a long way from the foundry business, but it was the start of the route that brings me into THE FOUNDRY today. After my source articles on the cigar store Indian had been published I was led by a complimentary letter from a reader, a pre-Pearl Harbor army colonel, to have another look-see at a cigar store Indian whose picture the colonel had admired. Then it was I learned that I had a lot more to learn even about cigar store Indians; this handsome chief was not a wooden Indian —he was metal. Many "wooden" Indians are not wooden at all.

This discovery sent me out into an uncharted world to discover where and by whom these metal "wooden Indians" were made. Months elapsed before the slightest clue could be obtained. It came at last when I made the acquaintance of a man whose father had been the largest manufacturer of, and dealer in, cigar store Indians, most of them wood. The clue led to Brooklyn and then to the section known as Williamsburg and finally to Maujer street, quite in the heart of a no-man's land so far as both Manhattanites and Brooklynites are concerned. One half day was spent in travel between the nearest elevated railroad station and Maujer Street. Policeman after policeman either expressed utter ignorance of the location of the street or else gave wrong directions. The policemen are not to be blamed too severely as Maujer is French and still to be pronounced Mo-shur, not Maow-jer.

By dead reckoning I seemed to be nearing the goal, but neither policemen nor firemen had ever heard of a foundry in that vicinity. Questioning the firemen somewhat facetiously we inquired if there were any old men in that area, to which they replied there wasn't an old man within five blocks, well, except a tobacconist around the corner. He proved to be 84 which, for all practical purposes, made him eligible as an old man. After considerable effort he did recall a foundry of some kind next to the schoolhouse he once had attended. How many years ago he could not say but he remembers the teachers used wood in the school stoves. Believe it or not, that schoolhouse proved to be just three blocks away.

I finally found a small rust-encrusted iron door-plate with the magic name of "M. J. Seelig & Company." Now I know what joy and thrill came to the discoverer of King Tut's tomb, the North Pole and the South ditto, not to mention the atomic bomb. A small frame building, exceedingly dilapidated, once had been the office of Seelig & Co. and probably M. J. Seelig's home. Of the old foundry group only one small, one-story brick building remains. Venus, lying prone, naked and forlorn, was on an unused back porch, and St. Joseph, partly mutilated and poised at an angle of 45°, were the last vestiges of probably the greatest foundry of its particular kind Amer-

ica had ever seen or will ever see again.

At the rear of the foundry building was a heap of rubbish perhaps 30 ft long and 10 or 12 ft high, looking very much like the pictures of bombed German cities. There were fragments of metal animals and statues, for a very considerable part of the Seelig output was statuary.

M. J. Seelig came from Germany and started this business about 1850. It was continued under some form or other by him or his descendants to about the time of World War I, the last molding done in this plant being the famous figure of "The Doughboy." The design, unfortunately for the Seelig family remnant, was not patented. At least that is what I was told by the only two survivors of the family I could find. They lived at Brighton Beach so close to high tide one could stand on the front porch and throw a stone into the Atlantic ocean. It is rather odd that they were both grandchildren of the Seeligs but no relation to each other. (I had that figured out once but don't recall the details). Both of them actually worked in the foundry and their memories were good.

There were no clap-trap or cheap methods or short cuts in the Seelig foundry. The artist first modeled a miniature design in clay. The design approved, a full-sized clay model followed and from this were made wax molds. From the wax molds, working or casting molds were shaped. The mold was never in one piece and in the case of statues, I was told, it sometimes had as many as 14 separate sections bolted together. The released cast showed ridges where the mold sections joined and it required the greatest skill to file away these joints, but so expertly was it done the articles had the appearance of having been cast in one piece.

By reason of multiple molds, new heads could be put on old bodies. Thereby hangs a tale. In the late fall of 1889, the Seelig foundry completed a great fountain for the Emperor of Brazil. The cost was $27,000 and the design included a statue of Dom Pedro II, himself. Before shipment was made and, specifically and significantly, on Nov. 14, 1889, a peaceful but efficient revolution fetched loose in Brazil and the new government refused to accept the fountain, even declining to consider the Seelig suggestion that the head of the new chief executive, Deogarode Fonseca, titled president, replace that of the emperor. In this case "one nail" did not "push out another," as touchingly related in Owen Meredith's *The Portrait*. The fountain became the deadest of dead horses, if you don't mind mixing metaphors.

The Seelig concern made a prodigious variety of subjects. I know of 97 different statues it cast, also 35 animals and birds, and 80 busts, vases and the like. Lawn statuary models ran into the hundreds. This is taking no account of ecclesiastical statues and figures which numbered 148 distinct subjects and some of these in various sizes. One could buy a good apostle, 5 ft, 9 in., for $89. Some saints cost less, some cost more. St. Ignace, for instance, cost $47, but he was smaller than average size. However, St. Anthony cost $3 more than St. Peter, exactly the same size, and St. Bernard, same height as the two foregoing, $36 more. St. Francis Xavier in Model 531 cost $300; in Model 394 only $47.

Psyche could be had in four styles: The life-size, seated with Amor's bow, or with Pandora's box, or with butterfly. The 5 ft size, $95, subject to advance in price without notice.

Venus, of course, naturally was among the first sought. She appeared in at least two different costumes and two different exposures, southern and northern. The larger Venus was the celebrated of Melos, heroic height, 7 ft, 6 in. The smaller was Canova's creation, 5 ft, 4 in., with 20-in. base.

Naturally, we would expect Apollo of Belvedere to be among those present and he surely was. In the majestic height of 7 ft, 4 in., complete with quiver and fig leaf, he was worth $230. This included the snake on the supporting rustic tree stump and probably there by association with the fig leaf.

Mercury, of course, was a (*Please turn to page* 249)

Above—Present state of the once fountainhead of iron and spelter fauna and lawn statuary. The foundry of M. J. Seelig & Co., Brooklyn, N. Y., occupied the one-story building, with office in three-story house at left and entrance to foundry yard between. From this foundry came such statues as (left) Mercury, posed taking off for Olympus; Venus, one of the best sellers, and (right) Psyche, the thoughtful, thinking it over

THE SUPPLY AND DEMAND FOR Foundry Engineers

By FREDERICK G. SEFING
International Nickel Co. Inc.
New York

Foundries need not fear competition from other industries for young engineers, provided an active recruiting program and careful plant training are adopted, according to the author, who is chairman of the AFA Committee on Co-operation with Engineering Schools

ALTHOUGH the foundry is a very old and important industry, its influence in manufacturing and trade is recognized as becoming greater than ever before. However, with the advent of new engineering materials and new methods of manufacture, the foundry's position in industry can be maintained and improved only by having men controlling its destinies who have the attributes of business acumen, vision, technical skill and dauntlessness. This requires not only that high caliber young men from schools and colleges want to become foundrymen, but also that foundries show a desire to employ them.

MR. SEFING

Young engineers enter the foundry industry generally as a result of several broad influences:

1. Having a conviction of the opportunities for engineers in the foundry.
2. By the foundry industry showing a keen desire for the services of trained engineers.
3. By the foundry using an interesting training program for these young men in the plant, so as to quickly whet their interest.

The desire to follow the foundry as a career results from a student's acquaintance with what a foundry does and from his knowledge of what the engineering opportunities are for him. Taking college courses in foundry practice under enthusiastic instructors, visiting foundries in operation and hearing inspiring talks by prominent foundrymen are all potent influences to convince young men that the foundry is a good place to work.

Much has been said and written about the need of good college foundry courses, scholarships for foundry engineers, lectures to college students, etc. Colleges and students have always been responsive to the industry's request for academic training in foundry technology. Many excellent courses are given with good equipment by inspiring instructors. This instruction, however, is a part of a general engineering training, and it must be remembered, therefore, that students regard themselves broadly trained engineers seeking employment with those companies offering the greatest opportunities for such training. This is to say that students still regard themselves to be in the open market for that engineering job with the best inducements, in spite of an inspiring exposure to foundry technology.

Colleges must, of necessity, train students in broad engineering fundamentals. Indeed, the trend in education today is away from specialization, except at the graduate level. This is an asset to foundry engineers because of the broad aspects of foundry problems involving physics, chemistry, design, machinery and mechanics, hydraulics, metallurgy, etc. Although this is a desireable background or a broad base upon which to develop a foundry engineer, such a training is also broad enough for the graduate to regard himself, as eligible for any egineering field. The student, who is, after all, a normal individual seeking the greatest opportunity for himself, examines all possible openings coming to his attention and will accept that job which to him seems the best at that time.

Foundries need have no fear of competition from other industries for young men. When properly presented, few industries can present as glowing a picture of engineering opportunities for the young man as the foundry industry. However, it is important that foundries needing engineering recruits contact the senior students in good time and not after most other industries have completed their interviews with senior students and have employed the most promising of them. It is suggested, therefore, that foundries keep in close touch with the engineering schools from which they hope to select graduates and learn when is the best time to make these contacts.

In employing young engineers, therefore, the foundry is in competition with other great industries: Power, automotive, steel, chemical, etc. The foundry must be prepared to meet this competition not only with an adequate, competitive salary offer, but also with other inducements, such as the opportunity for advancement and a review of some of the engineering problems of the prospective employer, which are typical (*Please turn to page* 230)

NAVY

By PAT DWYER
Engineering Editor
THE FOUNDRY

Fig. 1—General view of main bay showing cranes on three levels

Fig. 2—Cores are made and assembled on a mezzanine floor

★ Fig. 3—Gas is used for many purposes, including ladle drying

★ Fig. 4—Grinding wheels are guarded and operators are equipped with safety clothing

★ ★ ★ ★ ★ ★ ★ ★

YARD Revamps Foundry

This is the second and concluding article describing practice at the modernized foundry of the Norfolk Naval Shipyard, Portsmouth, Va. The first article appeared in September

NAVAL shipyard foundry personnel is civilian from apprentice to Master Molder. The yard management and executive group is made up of regular navy officers who do tours of 3 to 5 years. Navy influence and point of view are reflected in the adoption of and adherence to standardized practice in every phase of foundry operation—molding, melting, coremaking and cleaning. Extent to which the practice covers minute detail is shown in the following extract from the gray iron melting practice section of the *Standard Practice* book. Similar sections deal with melting practice for nonferrous metals, and mixtures, refractories and heat treatment.

"Cupola Dimensions: Inside diameter 36 in., outside diameter 48 in., hearth area 1018 sq in.; distance from hearth to top of tuyeres 18 in.; number and size of tuyeres six, two 4¼ x 5½ in. ports in each; total tuyere area 217 sq in.; distance from hearth to charging door 17¾ ft; charging door 26 x 27½ in.; bustle pipe diam 15¾ in., 4 bifurcating branches 12 in. diam; capacity of automatic air weight blower 6000 cfm; pressure 1.35 lb; normal windbox pressure 12-16 oz; air leakage (approx.) 10 per cent; melting rate 5.35 tons per hr; capacity in splits from hearth to charging door 5 to 6; coke size 1/12 cupola diam."

Unless otherwise instructed gray iron castings are made according to the chemical analysis shown in the accompanying Table I. Composition 1 is intended for all types and sizes of miscellaneous hardware castings. No. 2 is for low hydraulic pressure castings (under 80 psi) and for castings requiring fairly high physical properties. It is above average gray iron grade. No. 3 is intended for high pressure (over 80 psi) steam, air, water and oil castings. No. 4-1 is for wear resisting castings under ¾ in. thickness, subject to high stresses and shock. No. 4-2 is for wear resisting castings over ¾ in. thickness subject to high stresses and shock. No. 5 is intended for heat resisting application and where high strength is required. No. 6 is for ingot molds for foundry use. No. 7 is for applications requiring exceptional hardness, toughness, wear resistance and strength, crushing and grinding equipment and abrasion resisting castings. No. 8 is for high temperature applications and for applications where non-rusting qualities are desired.

The *Standard Practice* book deals with preparing the cupola for a heat: "The daubing material is applied in a manner to provide an inside diameter of 36-38, preferably 38 in. Paper and dry kindling wood are placed on the sand bottom, small pieces horizontally and larger pieces

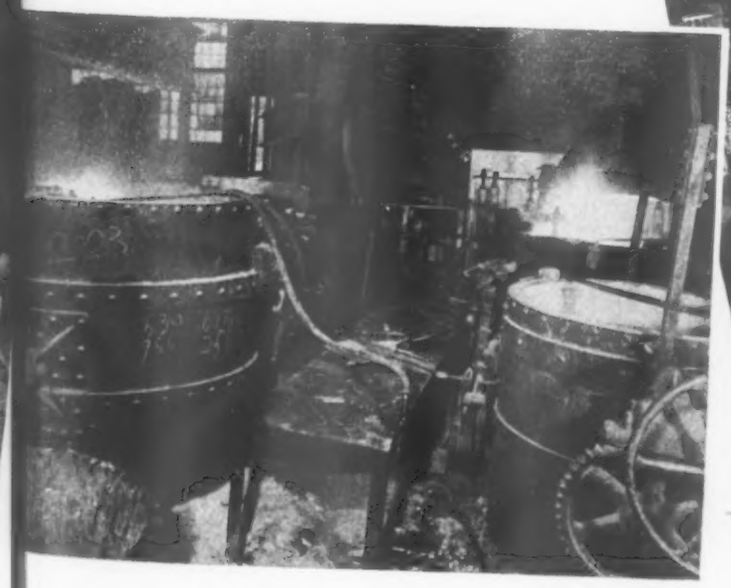


TABLE I—Analysis of Iron Castings

(% Chemical Composition, Max.)

Comp. No.	Alloy Type	C	Mn	P	S	Si	Ni	Cr	Mo
1	Plain iron	3.20—3.40	0.5—0.7	0.30	0.10	2.10—2.30	.....	.....	.....
2	Ni	3.10—3.30	0.7—0.9	0.30	0.10	2.10—2.20	1.25—1.75	.....	.....
3	Ni-Mo	3.10—3.30	0.7—0.9	0.20	0.10	2.00—2.20	1.25—1.75	.....	0.30
4-1	Ni-Cr-Mo	3.10—3.30	0.5—0.7	0.30	0.10	2.00—2.20	1.25—1.75	0.25—0.35	0.30—0.40
4-2	Ni-Cr-Mo	2.90—3.10	0.7—0.9	0.30	0.10	1.80—2.00	1.50—2.00	0.35—0.45	0.40—0.50
5	Cr-Mo	3.10—3.30	0.5—0.7	0.30	0.10	1.80—2.00	.....	0.50—0.60	0.40—0.50
6	Ingot	3.00—3.20	0.7—0.9	0.15	0.10	1.60—1.80	.....	.....	.....
7	Ni-Hard	3.20—3.40	0.7—0.9	0.20	0.10	0.60—0.70	4.25—4.75	1.9—2.1	.....
8	Ni-Resist	2.70—2.90	0.8—1.3	0.20	0.10	1.80—2.00	13.5—15.0	3.0—5.0	Cu 5.0—7.0

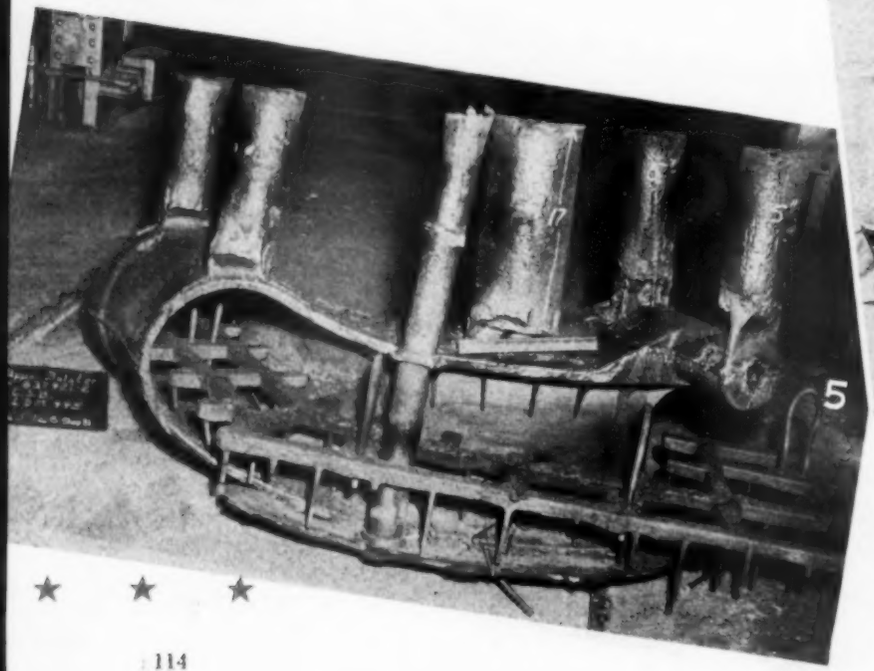
TABLE II—Analysis of Bronze Compositions

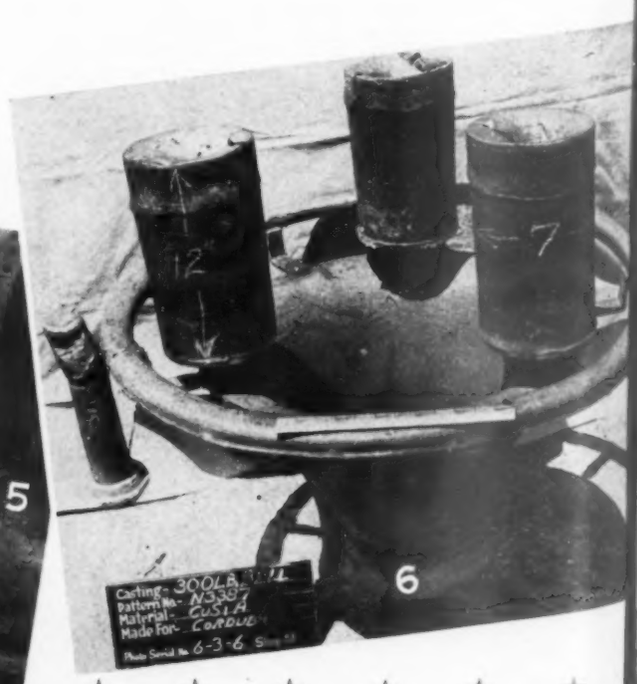
Alloy	Cu	Sn	Zn	Pb	Fe	Ni	P
Gun Metal	86—89	7.5—9.0	3.0—5.0	0.30 Max	0.15 Max	1.00 Max	0.05 Max
Valve	86—90	5.5—6.5	3.5—5.0	1—2	0.25 Max	1.00 Max	0.05 Max
Hydraulic	84—86	4—6	4—6	4—6	0.30 Max	1.00 Max	0.05 Max
Nickel Hydraulic	79.5—81.0	7	5	5	.....	2.5—3.0	0.05 Max
Bearing	82—85	7—9	0.75 Max	7—9	0.15 Max	1.00 Max	0.5 Max
Bearing	84—86	13—15	1.50 Max	0.20 Max	0.10 Max	0.75 Max	0.05 Max
Bearing	85—90	2.5—6	4.0 Max	0.50 Max	0.20 Max	2.5—6	0.05 Max
Mn Bronze	55—60	1.00 Max	33.5—44	0.40 Max	0.40—2.00	Al 0.50—1.50	Mn 1.50 Max
Al Bronze	88	.....	.....	.....	3.0	Al 9.00	.....
Al-Mn Bronze	65.75	0.5 Max	Remainder	0.20 Max	2—4	Al 3—7.5	Mn 2.5—5.0
Al-Mn Bronze	67.75	0.50 Max	Remainder	0.20 Max	2—4	Al 5	Mn 4

vertically to lean against the lining. This will prevent entrance of coke into the tuyeres. The wood is built to a height of 8 or 9 ft. No piece of wood should exceed 6 in. square or in diameter. The fire is started at 11 a.m. and the bed coke, 1300 lb, is added immediately. With a natural draft through the tuyeres the coke will be burned through to a dull cherry red in 1¾ hours, or by 12:45 p.m. With the aid of a hooked rod hanging from the door sill the coke is leveled and adjusted at a height of 7 ft above the hearth. Charging is commenced at 12:55 p.m. in the following order: Limestone 25 lb, over bed coke but away from the cupola lining; steel scrap; pig iron; nickel, when required; cast iron scrap, no piece over 30 lb in weight, or 12 in. in length or width or thickness; coke 150 lb, 3 to 4 in. in size; limestone 20 lb on each coke split.

"The blast is turned on at approximately 3:15 p.m., with the air regulator set to a delivery of 250 lb air per minute. Tuyere ports and tap hole are closed between 5 and 8 minutes later. Approximately 15 minutes after blast is turned on, the first metal is tapped into ladle in which the lining has been heated to a temperature of 1800-2000 F. This first metal is poured into relatively unimportant castings, flasks, crabs, gaggers and miscellaneous foundry equipment. Each consecutive charge thereafter is tapped at 5 to 6 minute intervals. A test bar is poured from each tap except the first, an unalloyed straight cast iron."

Cupola charge sheet for compositon No. 1 is typical of the charge sheets for the other seven compositions: "Limestone 25 lb, (¼-2 in.) on bed coke; steel 200 lb, in pieces ¼ to 1 in. thick; pig iron No. 1, 400 lb; cast iron scrap No. 1, 400 lb, no piece over 30 (*Please turn to page* 195)





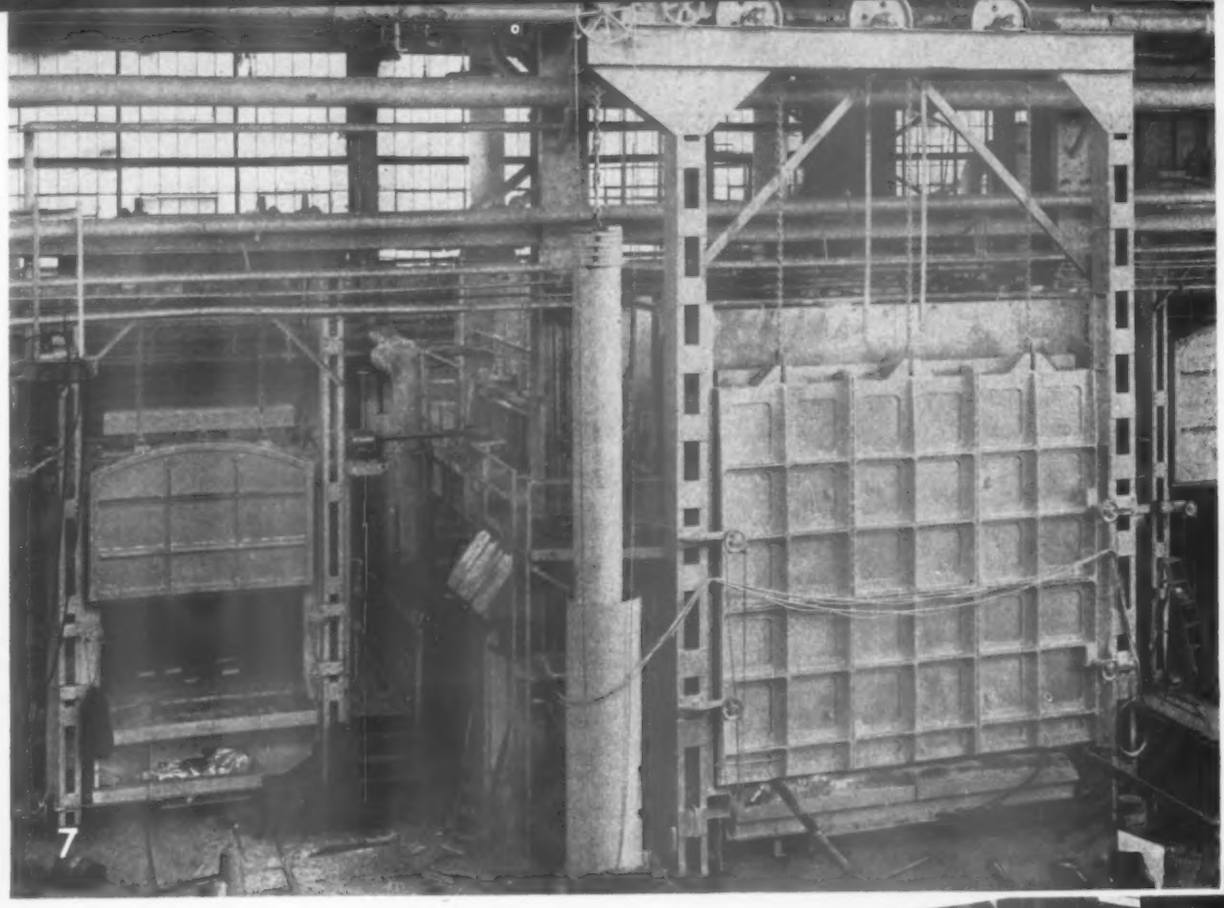


Fig. 5—A cast arbor supports the green sand core

Fig. 6—Bell is molded and cast in reversed position to that usually employed

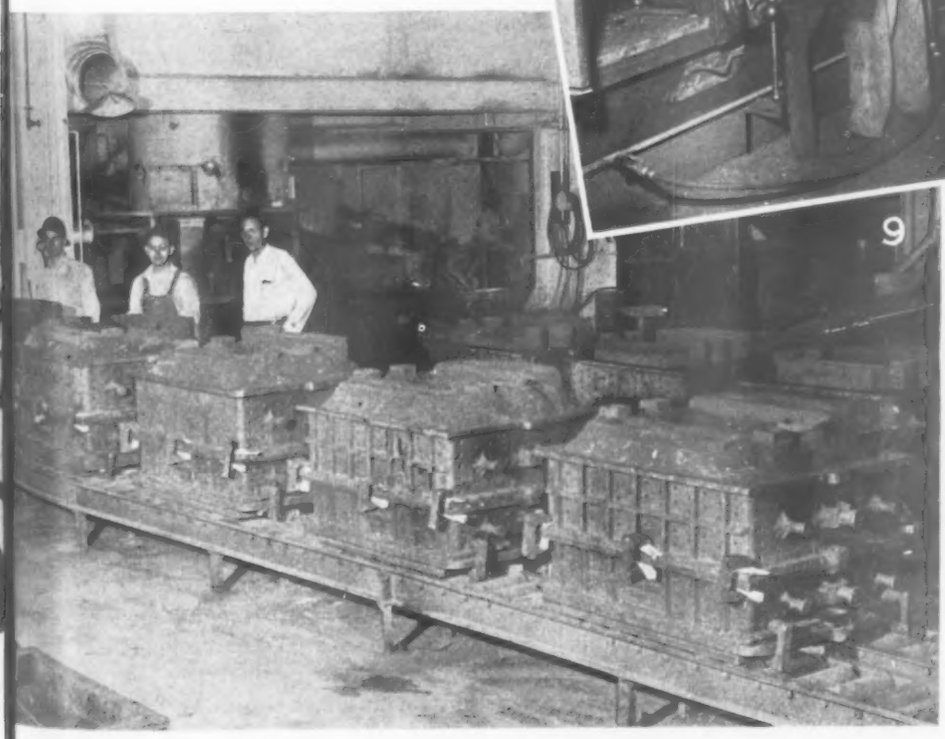


Fig. 7—Castings are heat treated in gas-fired ovens

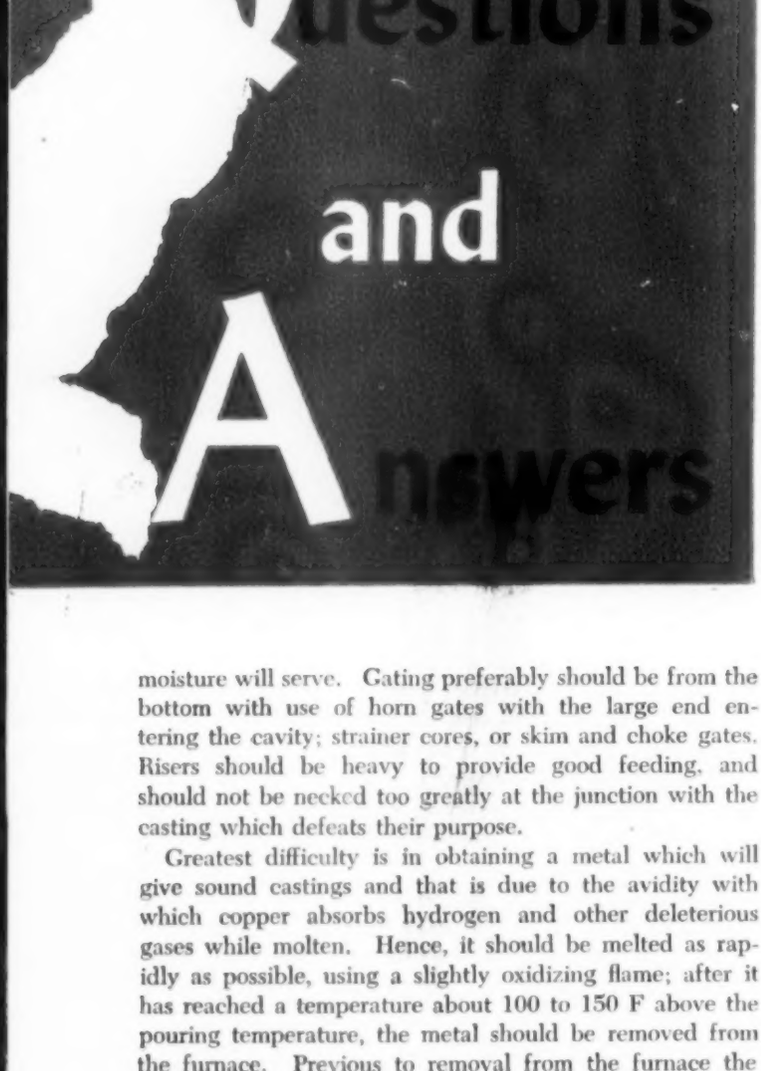
Fig. 8—Chipping benches are provided with safety partitions

Fig. 9—Dry sand runner basins on the copes are banked with green sand

Want To Make Copper Castings

Q.—We are interested in copper and beryllium-copper casting manufacture. Do you have any information on the subject?

A.—Not a great deal of information has been published on the production of copper or copper-beryllium castings. With reference to copper the difficulties encountered lie in obtaining a gas-free metal which will give sound castings rather than in molding practice. Generally a sand of about 100 grain fineness; 25 permeability; green compression 7 psi; clay content 10 per cent, and 6 per cent



moisture will serve. Gating preferably should be from the bottom with use of horn gates with the large end entering the cavity; strainer cores, or skim and choke gates. Risers should be heavy to provide good feeding, and should not be necked too greatly at the junction with the casting which defeats their purpose.

Greatest difficulty is in obtaining a metal which will give sound castings and that is due to the avidity with which copper absorbs hydrogen and other deleterious gases while molten. Hence, it should be melted as rapidly as possible, using a slightly oxidizing flame; after it has reached a temperature about 100 to 150 F above the pouring temperature, the metal should be removed from the furnace. Previous to removal from the furnace the copper should be degassed with some agent like lithium, calcium boride or other suitable material. It might be pointed out that in many cases the so-called pure copper castings contain about 2 per cent zinc, which acts as the deoxidizing and degasifying agent.

Beryllium-copper castings contain varying amounts of beryllium, which is added by means of a master alloy. Usual range is from 1.50 to 2.50 per cent in the castings. Procedure is to melt the copper under a covering of *dry* charcoal or glass and do that as speedily as possible. Temperature is raised to around 2200 F and then the copper bath is deoxidized and degasified with any of the previously mentioned agents. That step is essential because beryllium itself is a potent deoxidizer, and unless the melt has been treated previous to its addition, a large portion of the beryllium addition will be lost as far as alloying effect is concerned.

Master beryllium alloy is added in small pieces and the bath stirred with a graphite or nickel-chromium rod. Special care should be taken to see that the alloy does not float on top of the bath. One method to prevent that trouble might be to use a phosphorizer cup. Stirring should be gentle with a pumping action to stir from the bottom up without too much disturbance of the surface. Pouring temperature ranges from 1900 to 2100 F depending upon section thickness and intricacy of the casting. Heading and gating practice is similar to that used for copper castings.

Beryllium-copper castings may be heat treated to obtain various physical properties. For maximum softness and elongation and minimum tensile strength castings are heated to 1475 to 1500 F and held for at least 2 hr. Castings then are quenched in cold water. This operation is performed before machining and is the first step of the precipitation hardening treatment. The latter is accomplished by heating the castings at 525 to 575 F and holding from 3 to 24 hr. Details on specific alloy additions and suitable heat treatments may be obtained from the supplier of the master beryllium-copper alloy.

Making a Solid Aluminum Slug

Q.—Do you think it practical to make a solid aluminum casting 4 in. diam., and 6 in. in length, free from shrinks or other defects, in a permanent mold? If the method is practical we shall appreciate a sketch of a suitable mold.

A.—While it probably is within the realm of possibility to cast a solid cylindrical aluminum slug 4 x 6 in., in a permanent mold, in our opinion the method is not commercially practical. Unless more than average allowance is made for gate and riser, the casting will develop a pipe or shrinkage cavity in the center of the upper part. If an oversize riser is used, the cost of the extra metal would neutralize any profit on the job. Our suggestion is that you cast the metal in the form of a billet, 4 in., diam., and any convenient length, say 36 or 40 in. This casting can be cut into 6-in. slugs, with the exception of a few inches at the top end which will be discarded on account of the pipe in the center.

Several plants have been equipped in a special manner to produce billets of various diameters and an average length of 8 ft. The metal enters a comparatively short mold. As it solidifies it leaves the bottom slowly. The process has been described at length in several technical publications. The equipment is elaborate and expensive and is justified only where the billets are required in great numbers. Fairly satisfactory castings may be made in sand molds according to either one of two methods depending on the purpose for which the slugs are intended.

In either case the molds with 10 or 12 patterns may be made on the bench or on a small jolt machine. If the castings are to be used without any further processing or machine work, an aluminum insert 2 in. diam, standing in the center will prevent the casting from developing a pipe at the top. If the slug is to be machined or cut into a number of disks a feed riser will be required on top. The feed riser 4 in. diam and 4 in. high is attached to the casting through a ¾ or 1-in. hole in the center. The connection is made through a very thin flat core anchored in a shallow print either in the cope or in the drag.

Wants Casting Count System

Q.—We operate a small gray iron jobbing foundry and find it difficult to secure the right number of pieces out of our foundry for the dozens of difficult parts made each day. Can you give us the name and address of the publisher of a book on foundry systems?

A.—We shall need further and detailed information on what kind of a system you have in mind, before attempting to answer your inquiry. You say: "We find it very difficult to secure the right number of pieces out of our foundry for the dozens of difficult (different?) parts made each day." Presumably your foreman "Takes up the heat," that is, counts the molds on the floor before he charges the cupola. Next day the castings are cleaned and counted, so many good castings, so many scrap castings. We fail to see any difficulty in the performance. A competent foreman can carry the count in his mind for 10 or 12 molders. In one instance in a long experience, the *old man* entered the items on a slate. Each day the foundry clerk transferred the information to his official record. The foreman wiped the slate and repeated the performance. For office use a number of cards can be prepared, one for each molder every week. The cards are marked off into columns showing molder's name, pattern name and number, number of castings on order, number made each day, good castings, scrap, weight, number remaining and any other items of interest.

Blow Occurs in Faucet Casting

Q.—We are having trouble making basin cock faucets. Main difficulty is blow holes inside the casting. Can you tell us how that may be remedied?

A.—Difficulty with core blows in your basin cock faucets may result from one of two causes. First the core mixture now used is such that the requisite permeability is lacking. Second a suitable core mixture is being employed, but the molding sand is too dense or lacks permeability. As a general rule such plumbing goods are not vented, and the gases developed must escape through the core into the mold, and from the mold into the atmosphere. Hence, both must be sufficiently open to permit easy escape of the gases.

Cores preferably should be made of sharp sand bonded with linseed-base core oil or other suitable binder, and the sand pressed into the corebox rather than rammed so that the final core is quite permeable to gases. If a rough surface is produced in the casting interior, a coating of graphite, mica or talc wash will eliminate that trouble. Washes of that nature are made by a number of suppliers.

If you are satisfied that the core mixture is suitable, look into your molding sand, and molding practice. Try opening up a small batch of sand with coarser material, and observe the results. Then that practice can be applied to the rest of the heaps. Perhaps the molds may be rammed or squeezed too hard which reduces the permeability of the sand.

Water Jacket Castings Leak

Q.—Under city water pressure a large number of our water heater castings leak. The core in this casting, ¾-in. thick, 10½-in. diameter and 9 in. high, is river sand bonded with oil and dried in a gas fired oven. The casting has only two ¾-in. openings for cold and hot water connection. All the core vent has to pass through these two openings. We have tried a rust producing agent, but it is not satisfactory. Can we treat the iron in the ladle to prevent this form of defect? The core is very difficult to remove. The castings are tapped and plugged and then cleaned in a tumbling mill. The castings weigh 53 lb.

A.—Lack of adequate venting causes the metal to kick and boil in various areas. The casting solidifies before this action has stopped with the result that porous areas remain in the casting. In some instances the voids are microscopic, while in other instances the blow holes are quite visible. In the usual method the core is made in halves and the halves are pasted together after they are dried. Each half has a row of vent holes about 3 in. apart.

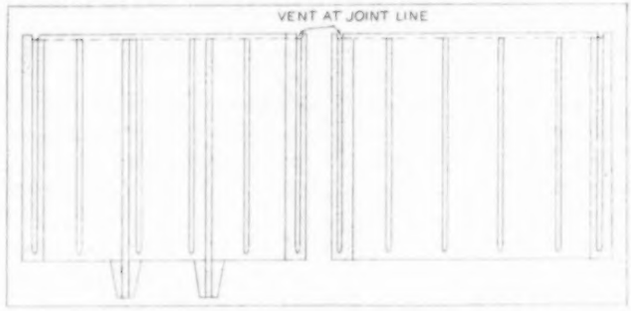
A skilful coremaker can use a vent wire to make these vent passages after the half corebox has been rammed full of sand. A less skilful man can stand a row of ⅛ or 3/16-in. rods in place after the first inch of sand has been packed in the bottom of the corebox. When the box is rammed to the top, the rods are pulled out and a vent

GANGWAY! By J. A. Patterson

"Sure, I said step outside an I say that—I couldn't hear a word you were sayn' in there."

plate is pressed down to form a semicircular channel over the vent holes. Where the vent wire is used, the channel is made first. A length of ¼-in. pipe pierced with many small vent holes is placed upright in the corebox section containing the two prints for the water connection.

These pipes extend to the vent channel at the joint line of the two halves, and also help to stiffen the prints which carry part of the weight when the core is in place in the mold where the prints rest on small pieces of plate with a ¼-in. hole in the center. Small pieces of plate or dry sand core are rammed against the face of the drag mold to support the chaplets. Incidentally the tin coated chaplets should be perfectly clean and perfectly dry. A damp or rusty chaplet causes a commotion in the metal in the vicinity, and a consequent leak. The core could be made



Sketch indicating the method of venting jacket cores for hot water heater

as a unit by using a wax vent instead of the channel at the joint. However, it would be necessary to use a thin sleeve on the inside. Otherwise the core would be very likely to sag while in the green state.

Several types of equipment are available for cleaning castings with sand or metal abrasive. Names and addresses of the manufacturers appear regularly in the advertising pages of THE FOUNDRY. Any of these companies will be pleased to consider your problem and suggest the most suitable form of cleaning device. Where the core is made from clear, sharp sand bonded with a minimum amount of oil, the dried and burned sand should flow readily through the two pipe connection openings. Introduction of molding sand, clay, etc., in the mixture to increase the green strength and thus prevent the core from sagging, will prevent the sand from flowing freely from the casting.

Material for a Foundry Floor

Q.—We have purchased an old foundry which we are about to renovate and modernize, and plans call for installing either a cement or black-top floor. Apparently the black-top floor would have a lower initial cost but we are wondering if you have any information on whether such a floor would stand up under foundry conditions. We believe that it would be satisfactory under the loads which we would put on it, but question the effect of dumping hot molds and castings on the black-top.

A.—We believe that the use of black-top material for a foundry floor would not be satisfactory since it has an asphalt or pitch base which would soften under heat. Possibly it might be used as the sub-base over which several inches of dry sand is placed followed by a layer of refractory and wear resisting brick which is laid and grouted. However, we believe that even with such practice, a sub-base of concrete will prove more satisfactory. If you plan on using concrete as the floor without any additional covering, it might be advisable to substitute highly refractory silica sand such as used in steel foundries for the sharp sand usually employed in the finish coat for concrete.

Melting Cast Iron Shavings

Q.—We will appreciate information on whether there is any method of melting cast iron shavings from the machine shop.

A.—A number of procedures are available for preparing cast iron borings in a form suitable for charging into the cupola. One is to make the borings into briquets in some form of a press capable of exerting the required pressure to make them sufficiently dense. Another developed years ago was to enclose the turnings in a tube about the size of the ordinary stovepipe which was capped, at both ends. Procedure was to cap one end of the tube, fill with borings, vibrate until well packed, and cap the open end.

Still another practice was to mix the borings with a small amount of Portland cement—just sufficient to make the borings hold together so they could be handled when dry without breakage—wet the mixture and mix thoroughly as in making concrete. Then the mixture was made into briquets or bricks of a size suitable for handling, and allowed to dry. Last but not least is the method used in some foundries of placing quantities of borings in the iron or sand pig molds for dumping over-iron or cold iron from ladles after pouring. That iron usually is fluid enough to bind the borings together, but not hot enough to dissolve them. With that procedure, be sure that the borings are dry or trouble will be encountered from metal splashing or even small explosions.

Sand Sticks in the Corebox

Q.—In making cores for impellers we use an aluminum alloy corebox, and have trouble with the sand sticking to it from time to time. How can we prevent that trouble?

A.—Sticking of sand in the corebox is due many times to improper relation of binder and moisture, but in your case where it happens at intervals, it may be due to lack of control of mixing. For best results the sand, moisture and binder should be added in a definite order and in exact quantities, if uniform results are desired. In addition, the whole should be mixed for a definite period based on experimental runs from which a standard is developed.

Sand sticking also may be due to the surface condition of the aluminum alloy. If it is porous you will have more trouble than when it is free of that condition. There seems to be some difference of opinion on whether the pattern or corebox should have a matte surface or a slightly polished one—so if you have either type you can change it to the other, and see what happens. Possibly giving the coreboxes a spraying of rubber might eliminate your trouble. We recall one foundry in which wood coreboxes, although well shellacked, gave considerable trouble in the summertime due to excessively humid atmospheric conditions. Use of the rubber spray practically eliminated trouble from sand sticking in the box.

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MEN of Industry

C. E. HOYT

OSCAR T. MARZKE

C. E. Hoyt retired as treasurer of the American Foundrymen's Association on Aug. 1, thereby terminating a long period of valued service to both the AFA and the foundry industry. Mr. Hoyt's earliest association with the industry was with his father in operating a foundry at Wayland, Mich., and later in teaching foundry practice at Michigan State College and the former Lewis Institute, Chicago. He was elected secretary of the Associated Foundry Foremen in 1908, and in 1909 became secretary of the Foundry Supply Association. The latter was succeeded by the Foundry and Machine Exhibition Co. in 1911, with Mr. Hoyt named as secretary, and when its exhibitions were taken over in 1916 by the AFA he was appointed manager of exhibits. Two years later he was elected secretary-treasurer of the association, and for the next 23 years continued as the chief administrative officer of the AFA. In 1937 Mr. Hoyt assumed the newly created office of executive vice president, and after relinquishing this position in 1941 continued as convention and exhibit manager. The latter title was vacated in 1943 and Mr. Hoyt became treasurer, which office he held until his recent retirement.

♦ ♦ ♦

Oscar T. Marzke has been appointed superintendent of the division of metallurgy, Naval Research Laboratory, Washington. Mr. Marzke, born in Lansing, Mich., was graduated from Michigan State College in 1929 and received his doctor's degree in metallurgy from Massachusetts Institute of Technology in 1932. He was a contract employee, Naval Research Laboratory, in 1930, and joined American Steel & Wire Co., Worecester, Masss., in 1933, as a laboratory worker. He subsequently became works metallurgist there and in 1942 was transferred to the company's Waukegan Works in like capacity, where he remained for the last four years.

♦ ♦ ♦

Paul P. Bergmann has been put in charge of the centrifugal casting and permanent molding departments, Western Brass Works, Los Angeles. Mr. Bergmann was formerly plant superintendent of the West coast division of Ampco Metal Inc., established at Burbank, Calif., in 1943. He attended Purdue University and joined Ampco in 1934 as an apprentice melter at the parent plant in Milwaukee. Later he became foreman, supervisor of the centrifugal casting department, and superintendent.

♦ ♦ ♦

Joseph Schumacher, recently elected chairman of the Cincinnati Chapter of the AFA, is chief engineer in charge of research and service, the Hill & Griffith Co., Cincinnati. A native of Hillsboro, O., Mr. Schumacher attended Denison University and was graduated from Ohio State University in 1936. He was supervisor of foundry laboratories and metallurgical department, Cincinnati Milling Machine Co., until 1944, when he joined Hill & Griffith. Active in the Cincinnati Chapter for a number of years, he served as secretary in 1944-45 and as vice chairman last term.

♦ ♦ ♦

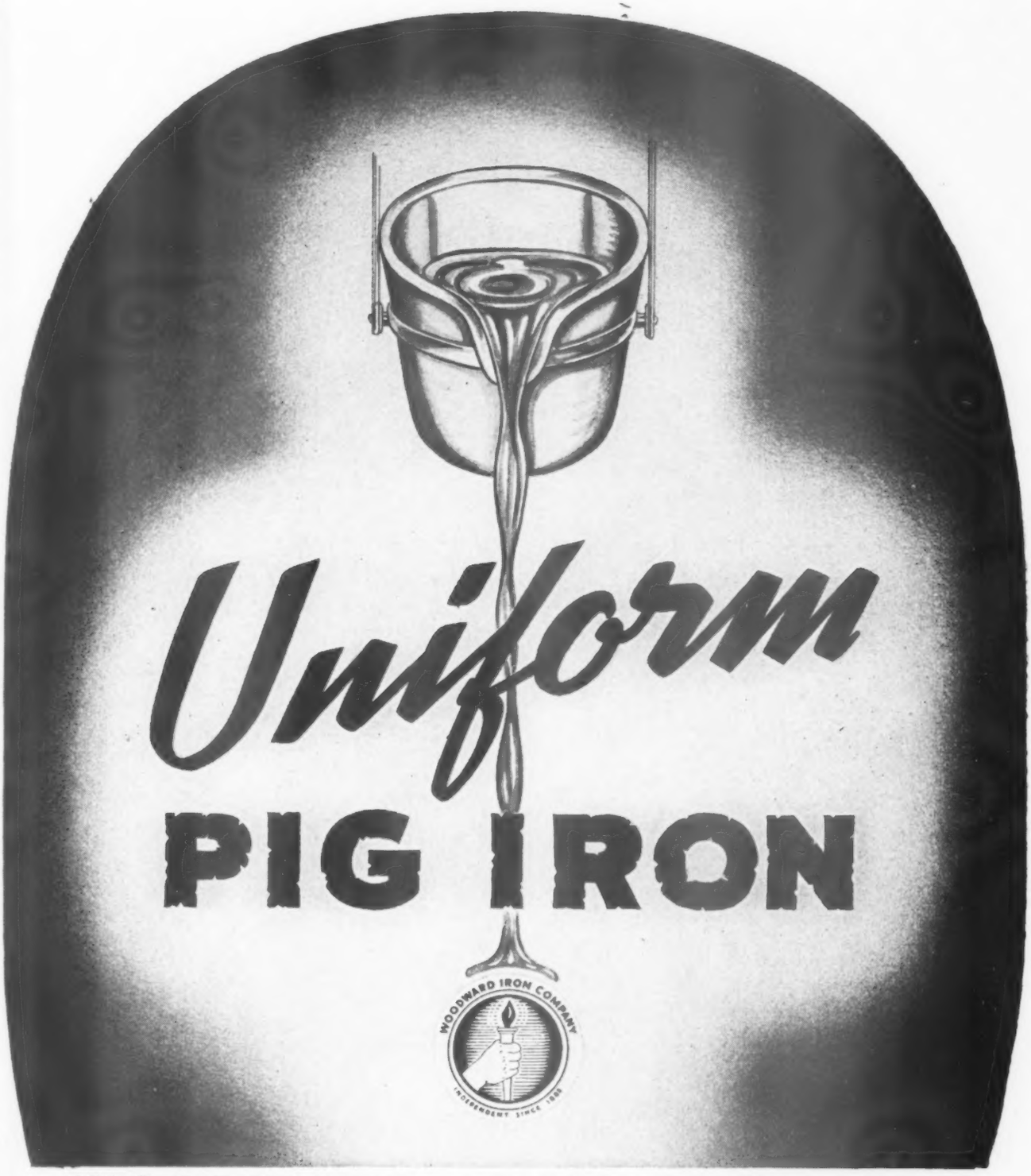
James G. Goldie has resigned as foundry instructor, Cleveland Trade School, Cleveland, to become associated with the MBM Foundry Inc., Garfield Heights.

(*Continued on page* 122)

PAUL P. BERGMANN

JOSEPH SCHUMACHER

JAMES G. GOLDIE



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(*Continued from page 120*)

O. Mr. Goldie served his foundry apprenticeship with John Cochrane Ltd., marine engineers and machine tool builders, Barrhead, Scotland, where he was born. He received technical training at Glasgow Technical College, and in 1923 came to the United States where he worked in various eastern foundries before taking charge of the foundry department of the Connecticut State Trade School, at Meriden. In 1929 he went to Cleveland to establish the foundry department at Cleveland Trade School, and received professional teacher training at Western Reserve University and University of Akron. Mr. Goldie was president of the Northeastern Ohio Chapter of the AFA in 1943-44.

♦ ♦ ♦

R. H. Swartz, president and general manager of the S & W Corp., Bettendorf, Iowa, a new organization which has just started production of gray iron castings, until recently was president of the Ferro-Bronze Corp., Moline, Ill. Mr. Swartz formerly was chief metallurgist and superintendent of production for Ordnance Steel Foundry Co., Bettendorf, and previously was with the Bettendorf Co. in a like capacity. Prior to that, Mr. Swartz served in metallurgical capacities with Northwestern Steel & Wire Co., Sterling, Ill., Keystone Steel Co., and Caterpillar Tractor Co., both of Peoria, Ill. He is vice chairman of the Quad City Chapter of the AFA this year.

♦ ♦ ♦

Charles C. Brisbois, until recently foundry superintendent, the Robert Mitchell Co., Montreal, has been appointed foundry superintendent, Sorel Industries Ltd., Sorel, Que. Mr. Brisbois, a native of Ottawa, has had 32 years of foundry experience, the last 17 with the Robert Mitchell Co. Following graduation from L'Academie de LaSalle, Ottawa, he became a molder and later coremaker for the Ottawa Steel & Iron Castings Co. Ltd., Ottawa. He later turned to melting, studying the operation of all classes of furnaces and methods of melting various kinds of metals. He was assistant superintendent of Ottawa Steel & Iron when he left to join the Thomas Davidson Co. as foundry foreman in 1923. He remained there until 1929 when he joined the Mitchell organization. Mr. Brisbois was chairman of the Eastern Canada and Newfoundland Chapter of the AFA during 1942-43 and was recently elected a director for 1946-47.

♦ ♦ ♦

George K. Minert, until recently metallurgist, Fort Pitt Malleable Iron Co., McKees Rocks, Pa., has been appointed metallurgist and melting supervisor, National Motor Castings Division of Campbell, Wyant & Cannon Foundry Co., South Haven, Mich. Mr. Minert was educated in the Rockford, Ill., schools, and took various extension and correspondence courses. From 1929 to 1932 he was laboratory assistant, Rockford Northwestern Malleable Corp., later becoming chemist, Gunite Foundries Corp., Rockford, for two years. He left the latter organization and spent a few months as metallurgist, Illinois Malleable Iron Co., Decatur, Ill., returning to Gunite Foundries as assistant metallurgist from 1936 to 1944, when he joined Fort Pitt Malleable. Mr. Minert has served as chairman, director and secretary-treasurer, Northern Illinois and Southern Wisconsin Chapter of the AFA.

♦ ♦ ♦

Peter E. Kyle has been appointed professor of metallurgy, College of Engineering, Cornell University, where he will help organize a new curriculum in metallurgical engineering and develop courses in metal processing, involving casting, hot and cold working and welding. Prof. Kyle, a native of Lakeport, N. H., became a machinist apprentice at Scott & Williams Inc., Lakeport, before joining Westinghouse Electric Corp., East Pittsburgh, Pa., as a student engineer. He remained there from 1927-1929, becoming laboratory assistant in the research laboratories and attending Carnegie Institute of Technology's evening courses. He was graduated from Cornell University in 1933, attended the graduate school of Lehigh University, and received a master's degree from Massachusetts Institute of Technology in 1939. While at the latter school from 1934 to 1946 he was in charge of courses on materials and metal processing and was made an associate professor in 1944. Prof. Kyle is an active member of the AFA and has served on various committees. At Cornell he will also be in charge of the AFA project on the high temperature properties of steel sands. During the recent war he was research supervisor and staff assistant for the Products Research Division of the War Metallurgy Committee while on leave from M.I.T., in 1943-44.

♦ ♦ ♦

William W. Maloney, for the past year secretary of the American Foundrymen's Association, was elected secretary-treasurer at the recent annual meeting of the board of directors. **S. C. Massari** was appointed technical director and **John P. Mullen** was named assistant treasurer in charge of public relations. Both Mr. Massari and Mr. Mullen joined the AFA office staff last February on a temporary basis.

♦ ♦ ♦

Bruce H. Norman, formerly associated with Caterpillar Co., Peoria, Ill., has been appointed foreman in charge of melting at the Hazel Park foundry of Donovan Inc., St. Paul. Mr. Norman worked as a coremaker, molder and melter at Caterpillar from 1930 until he entered the Navy in 1942, where he

(*Continued on page 126*)

R. H. SWARTZ

CHARLES C. BRISBOIS

GEORGE K. MINERT

PETER E. KYLE

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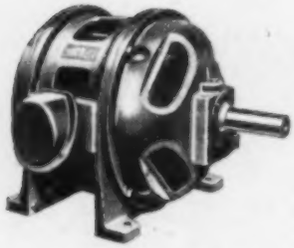


WESTINGHOUSE ELECTRIC MOTORS

Motor frames, brackets, end plates and housings are just a few of the many types of castings which are Wheelabrated at Westinghouse Electric Co. Low operating costs and speed cleaning performance are reasons why Wheelabrators are chosen by Westinghouse for their cleaning requirements.

KELVINATOR REFRIGERATORS

112 Refrigerator motor housings (1000 pounds to a load) are Wheelabrated in a 48" x 42" Wheelabrator Tumblast in ten minutes. Wheelabrating is effecting important savings and improved cleaning performance on these and other castings used in Kelvinator refrigerators.

WHEELABRATOR NATIONALLY USED FOR NATIONALLY KNOWN PRODUCTS

The list of manufacturers, coast to coast, who depend on the Airless Wheelabrator for faster, more thorough cleaning of castings reads like a "Who's Who" of Industry. The varied types of castings cleaned, covers practically the entire field of metal products.

The Airless Wheelabrator's wide acceptance is due to its fast, cost-reducing performance and the perfection of its cleaning. Utilizing the power of centrifugal force, the Wheelabrator hurls 280,000 abrasive particles per second, removing sand and scale right down to the virgin metal. This speeds up machining and grinding . . . lengthens tool life . . . simplifies inspection . . . improves appearance . . . provides a perfect bond for final finishing.

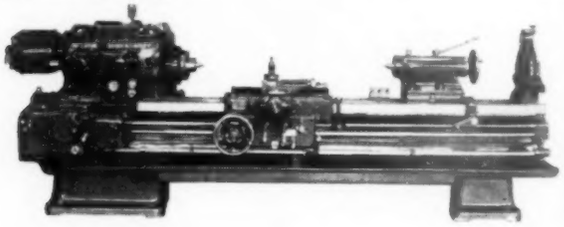
Besides the "case histories" illustrated, Allis-Chalmers . . . General Electric . . . General Motors . . . International Harvester . . . Bendix . . . U. S. Steel . . . are but a few of the long list of progressive manufacturers using the Wheelabrator. Write today for full information on how the Airless Wheelabrator can be applied to your cleaning problems.

KOHLER BATHTUBS

Sanitary ware, including bath tubs, sinks and miscellaneous small pieces are Wheelabrated in a Wheelabrator Monorail Cabinet prior to enameling at Kohler Co., Kohler, Wisconsin. Uniformly and thoroughly cleaned, every Wheelabrated surface has the proper finish to anchor the enamel to the metal.

LODGE & SHIPLEY LATHES

Machine tool castings up to 420 pounds each are cleaned on a No. 3 Wheelabrator Multi-Table at Lodge & Shipley Machine Tool Co., Cincinnati. Although all castings are purchased outside they are Wheelabrated to insure a perfectly clean surface prior to machining and grinding.

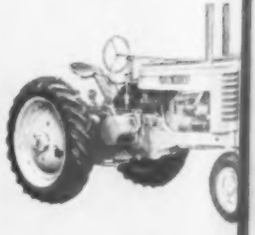


MAGIC CHEF RANGES

The first step to beauty in the Magic Chef gas range is a Wheelabrated surface on all enameled castings. A No. 2 Wheelabrator Multi-Table is used for cleaning these and other castings at American Stove Co., Cleveland.

JOHN DEERE TRACTORS

It's easy to understand why John Deere Co. depends upon the Wheelabrator for cleaning tractor and agricultural castings at their various plants. At one plant a Wheelabrator Tumblast is cleaning pieces in ten minutes which had formerly required a 1½ hour tumbling period followed by a recleaning on airblast tables for another hour.



MACK TRUCKS

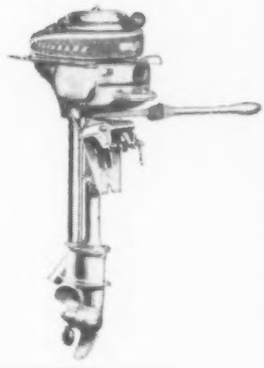
At the Mack Mfg. Corp., New Brunswick, N. J., two 48" x 72" Wheelabrator Tumblasts speed the cleaning of large and small truck castings. These castings consist of cylinder blocks, heads, transmission cases, water pump housings, etc. Cleaning time varies from 8 to 12 minutes depending upon the size and shape of pieces handled.

CATERPILLAR TRACTORS

Caterpillar equipment, built-to-take-it on the toughest assignments, incorporates scores of Wheelabrated castings such as: manifolds, engine heads, gears, brackets, housings, structural members, etc. More than 60,000 pounds of green castings are cleaned in eight hours in each of their two 48" x 48" Wheelabrators.

AMERICAN RADIATOR & STANDARD SANITARY CORP. BOILERS

Boiler fronts, furnace grates and fire pots are Wheelabrated in a Wheelabrator Tumblast at one of the plants of American Radiator & Standard Sanitary Corp. Sanitary ware and other castings are Wheelabrated in other plants of this company, which is operating thirteen Wheelabrators.

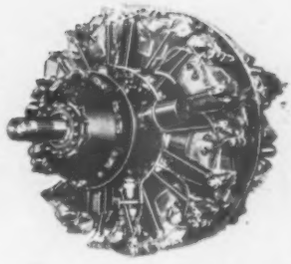


EVINRUDE OUTBOARD MOTORS

Wheelabrating is extensively used for the cleaning of parts used in sporting goods. In addition to outboard motor castings made by Evinrude Motors Division, golf club heads, bar bell weight lifting devices, bicycle parts, rifles, shot guns, etc., are being Wheelabrated by leading manufacturers.

WRIGHT CYCLONE ENGINES

Wright Cyclone aircraft engines that must be corrosion-proofed for sea duty are metallized. To obtain the correct bond for this operation the surfaces of the deep finned cylinders are Wheelabrated in specially designed machines. 93 Wheelabrators are in operation at their various plants.



MAYTAG WASHERS

Typical Maytag washer castings cleaned in Wheelabrator equipment at the Maytag Co., Newton, Iowa include: wringer frames, locks, heads, and uncut gears. These parts are cleaned in a 27" x 36" Wheelabrator Tumblast in a fraction of the time formerly required with an airblast table and several barrels.

CRANE VALVES

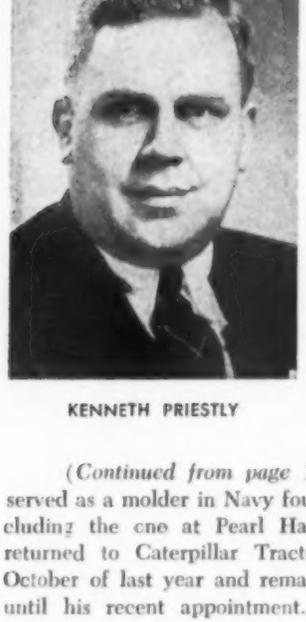
The outstanding performance and rugged endurance of the Wheelabrator are daily demonstrated in the speed-cleaning of large-heavy, difficult-to-clean steel valves and castings at Crane Co., Chicago. Four Wheelabrator Tumblasts and a Wheelabrator Cabinet are installed in their foundry.

Wheelabrator Tumblasts
Eight standard sizes ranging from 1 cu. ft. to 63 cu. ft. capacity for cleaning loads in which individual pieces may vary from a fraction of an ounce to over 1,000 lbs. each.
Made in Plain Table, Swing Table and Multi-Rotary Table Types and in numerous standard sizes for cleaning flat or fragile work that is not adapted to tumbling.
Wheelabrator Tables
Wheelabrator Cabinets
Cabinets are designed for special production requirements or where work cannot be adapted to a standard machine Examples: cylinder blocks, bath tubs, crankshafts, etc.

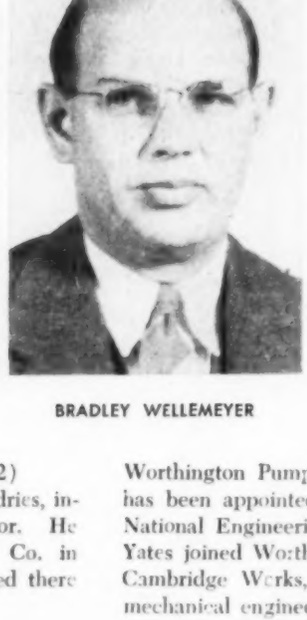
American
FOUNDRY EQUIPMENT CO.

505 S. BYRKIT ST. MISHAWAKA, INDIANA

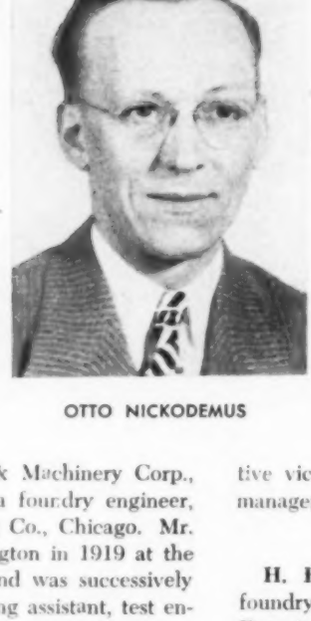
AIRLESS BLAST EQUIPMENT



KENNETH PRIESTLY



BRADLEY WELLEMEYER



OTTO NICKODEMUS

ALFRED KUNZ

(*Continued from page* 122)
served as a molder in Navy foundries, including the one at Pearl Harbor. He returned to Caterpillar Tractor Co. in October of last year and remained there until his recent appointment.

• • •

Kenneth Priestley is president of the new Vassar Electroloy Products Inc., Vassar, Mich., a company formed for the production of castings of corrosion, heat and abrasion resisting alloys. Other officers of the company include **Alfred Kunz,** vice president; **Bradley Wellemeyer,** secretary, and **Otto Nickodemus,** treasurer. The four founders of the new organization formerly were associated with Eaton Mfg. Co., Foundry Division, Vassar. Mr. Priestly, until recently research metallurgist, spent 12 years with Eaton. Mr. Kunz joined the company 12 years ago after having spent one year with Saginaw Malleable Division of General Motors Corp., Messrs. Wellemeyer and Nickodemus were associated with the Foundry Division of Eaton for 13 and 12 years, respectively.

• • •

James L. Yates, until recently construction engineer at the Buffalo plant of Worthington Pump & Machinery Corp., has been appointed a foundry engineer, National Engineering Co., Chicago. Mr. Yates joined Worthington in 1919 at the Cambridge Works, and was successively mechanical engineering assistant, test engineer, manager of service and erection, chief inspector and engineer of construction, handling plant and foundry expansion. A graduate of Massachusetts Institute of Technology, he has taught courses in modern foundry practice at University of Buffalo. Mr. Yates is a former director of the Western New York Chapter of the AFA.

• • •

J. Donald Zaiser has been elected president and general manager, Ampco Metal Inc., Milwaukee, succeeding his father, the late **C. J. Zaiser.** Mr. Zaiser has been associated with the company since 1933 when he joined Ampco's production department following his graduation from Purdue University. In 1934 he was made field salesman and in 1936 was appointed department manager. He became general sales manager in 1938, vice president and assistant general manager two years later, executive vice president in 1944 and general manager the following year.

• • •

H. H. Fairfield has been appointed foundry consultant, H. W. Dietert Co., Detroit. Mr. Fairfield served his foundry apprenticeship in a malleable jobbing foundry and was graduated from General Motors Institute in 1937. For the following three years he was employed by General Motors of Canada, in charge of chemicals, metallographs and sand testing in a mechanized gray iron and malleable foundry established there. Since 1940 he has been engaged as metallurgical engineer with the Physical Metallurgy Research Laboratories of Canada.

• • •

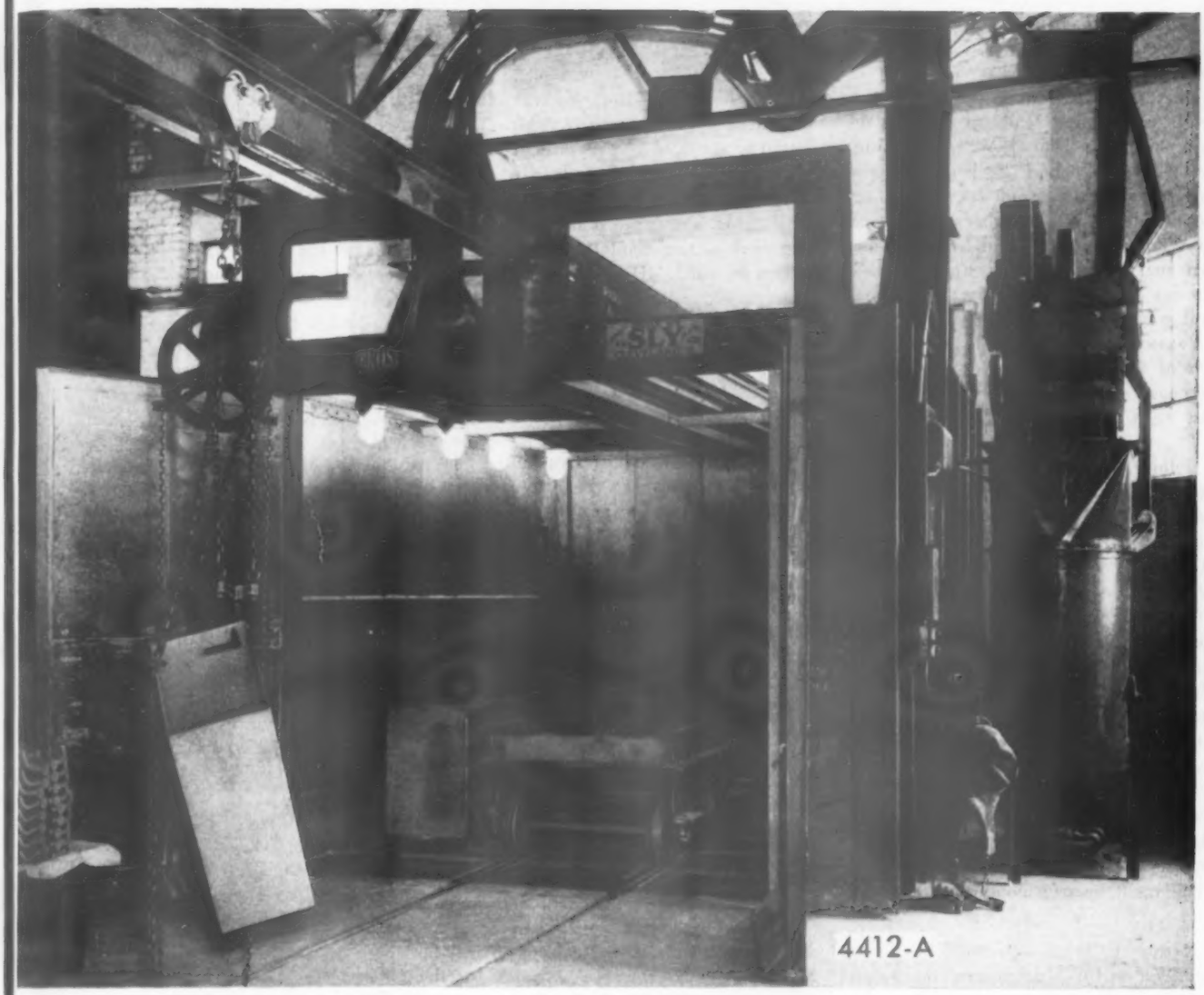
J. A. Wotherspoon, who has been elected chairman of the Ontario Chapter of the AFA for 1946-47, since 1938 has been general manager of Anthes-Imperial Ltd. and its associate companies, Anthes Foundry Ltd. and Imperial Iron Corp. Ltd., St. Catharines, Ont. Mr. Wotherspoon was born in Perth, Scotland, going to Canada in 1910. Following service with the Can-
(*Continued on page* 128)

JAMES L. YATES

J. DONALD ZAISER

H. H. FAIRFIELD

J. A. WOTHERSPOON



SLY BLAST ROOM

DESIGNED FOR EFFICIENT CLEANING—RIGIDLY BUILT FOR LONG LIFE

Down-Draft Ventilation facilitates uniform entrance of air for ventilation.

A Triple Slotted Ceiling distributes the ventilating air all over the room, at the same time preventing the escape of rebounding abrasive.

Vent Ducts in two-room walls have inlet openings at bottom to draw the ventilating air and dust down.

Clear Vision is obtained by constant and effective exhaust of the dust.

Excellent Illumination is provided by special blast room lighting fixtures with glass globes ½" thick.

Steel Liners 3/16" thick are attached to inside of room walls and doors for wear protection.

Perforated Floor Plates are supported by a grating for a strong and safe floor.

Ask for the Sly Condensed Catalog describing our complete line of Dust Control and Sandblast Equipment.

Tell us about your cleaning problem.

THE W. W. SLY MANUFACTURING COMPANY • 4753 TRAIN AVENUE • CLEVELAND 2, OHIO

SLY INDUSTRIAL DUST CONTROL

TUMBLING MILLS • BLAST CLEANING EQUIPMENT

(*Continued from page* 126)

adian Army during World War I, he became associated with Maj. L. L. Anthes in soldier civil re-establishment work under the Dominion government and in 1922 joined Anthes Foundry Ltd., Toronto, where he became assistant superintendent and later plant superintendent. Mr. Worthersp:on moved to Winnipeg in 1927 and became western manager of Anthes Foundry Ltd. Eleven years later he was made general manager of the parent company and its associate branches. An active member of the Ontario Chapter, Mr. Wotherspoon served as its vice chairman last term.

♦ ♦ ♦

John J. Harant, recently elected secretary-treasurer of the Malleable Founders' Society, was formerly director of budgets at the Eddystone, Pa., plant of Baldwin Locomotive Works, Philadelphia. Before he joined Baldwin in 1941, Mr. Harant was chief industrial engineer, Seaboard Commercial Corp., and prior to that, plant manager, Standard Gas Equipment Corp. He received his basic training in engineering and business administration with Bethlehem Steel Corp., over a period of 15 years. From 1927-1932 he was comptroller, Industrial Brownhoist; assisted in the reorganization of American Type Founders Co.; and was for a time associated with McKinsey Wellington, management consultants.

♦ ♦ ♦

Henry J. Trenkamp, recently elected president of the Northeastern Ohio Chapter of the AFA, is president of the Ohio Foundry Co., Cleveland. Mr. Trenkamp was born in Cleveland in 1891, attended East High School and was graduated from St. Ignatius College, now John Carroll University, Cleveland. For the past thirty years he has been connected with the Ohio Foundry, his first position with the organization having been that of timekeeper. Later he was in charge of production, was connected with the sales department and then was sales manager, and in 1943 was made assistant treasurer. In 1944 he was elected president of the company. Mr. Trenkamp is the third generation of the family to head the Ohio Foundry Co., which was organized by his grandfather in 1893. Mr. Trenkamp has been active in the work of the chapter since its organization in 1935. He has served on numerous committees, as a director, and during the past year was vice president and program chairman. He has also been active in the work of the Gray Iron Founders' Society.

♦ ♦ ♦

L. C. Hollien has been appointed general sales manager, the Brewster Co. Inc., Shreveport, La., manufacturer of oil field equipment. Mr. Hollien joined Texas Electric Steel Casting Co., Houston, Tex., in 1928, as general office clerk. During the following 15 years he worked in practically every department in the foundry there, and was foundry superintendent when he joined the foundry division of J. B. Beaird Co., Shreveport, La. in 1943. Hr. Hollien was assistant superintendent and later superintendent at that company. He joined the Brewster organization in June, 1945, to take charge of labor relations.

♦ ♦ ♦

Gottfrid Olson, recently foundry engineer, National Founders Association, Chicago, has retired after 51 years in the foundry industry. He plans to spend a year in Europe visiting industrial countries, with headquarters in Stockholm, Sweden. Mr. Olson was associated with Chicago Hardware Foundry Co., and Manitoba Bridge & Iron Co., Winnipeg, Man., for a time, and joined Illinois Malleable Iron Co., Chicago, in 1917, where he became foundry superintendent. In 1927 he went to Sweden as general manager of the Katrineholm Works, Pump Separator Co., Stockholm, but returned to Illinois Malleable Iron Co., in 1930. In 1936 he joined the National Founders Association. Mr. Olson is a former president of the Chicago Foundrymen's Club, predecessor of the Chicago Chapter of the AFA.

♦ ♦ ♦

Thurston C. Merriman, until recently metallurgist, Seymour Mfg. Co., Seymour, Conn., has been appointed consulting metallurgist, Phosphor Bronze Smelting Co., Philadelphia. Mr. Merriman was graduated from Massachusetts Institute of Technology and from 1909-15 was assistant metallurgist, American Brass Co., Waterbury, Conn. Other connections include Winchester Repeating Arms Co., Western Electric Co., and Western Cartridge Co. He joined Seymour Mfg. Co. in 1929 and was in charge of the chemical and physical testing laboratories, and research in the mill.

♦ ♦ ♦

James M. Planten, recently released by the Navy, has joined the organization of Lester B. Knight & Associates Inc., Chicago. Prior to military service Mr. Planten spent two years with Sperry Gyroscope Inc., as foundry superintendent and foundry engineer, and four years previous to that as foundry engineer, Wright Aeronautical Corp.

♦ ♦ ♦

Ernest S. Theiss has been appointed assistant chief engineer, Davey Compressor Co., Kent, O. For the last 7 years Mr. Theiss has served as assistant professor, Mechanical Engineering Department, Duke University. He was graduated from Case School of Applied Science in 1932 and received his master's degree there in 1939.

♦ ♦ ♦

Clarence H. Collier Jr. has been appointed manager of the Industrial Lift Truck Eastern division, Hyster Co., Portland, Oreg., with headquarters in Peoria, Ill. Mr. Collier has been asso-

(*Continued on page* 130)

JOHN J. HARANT

HENRY J. TRENKAMP

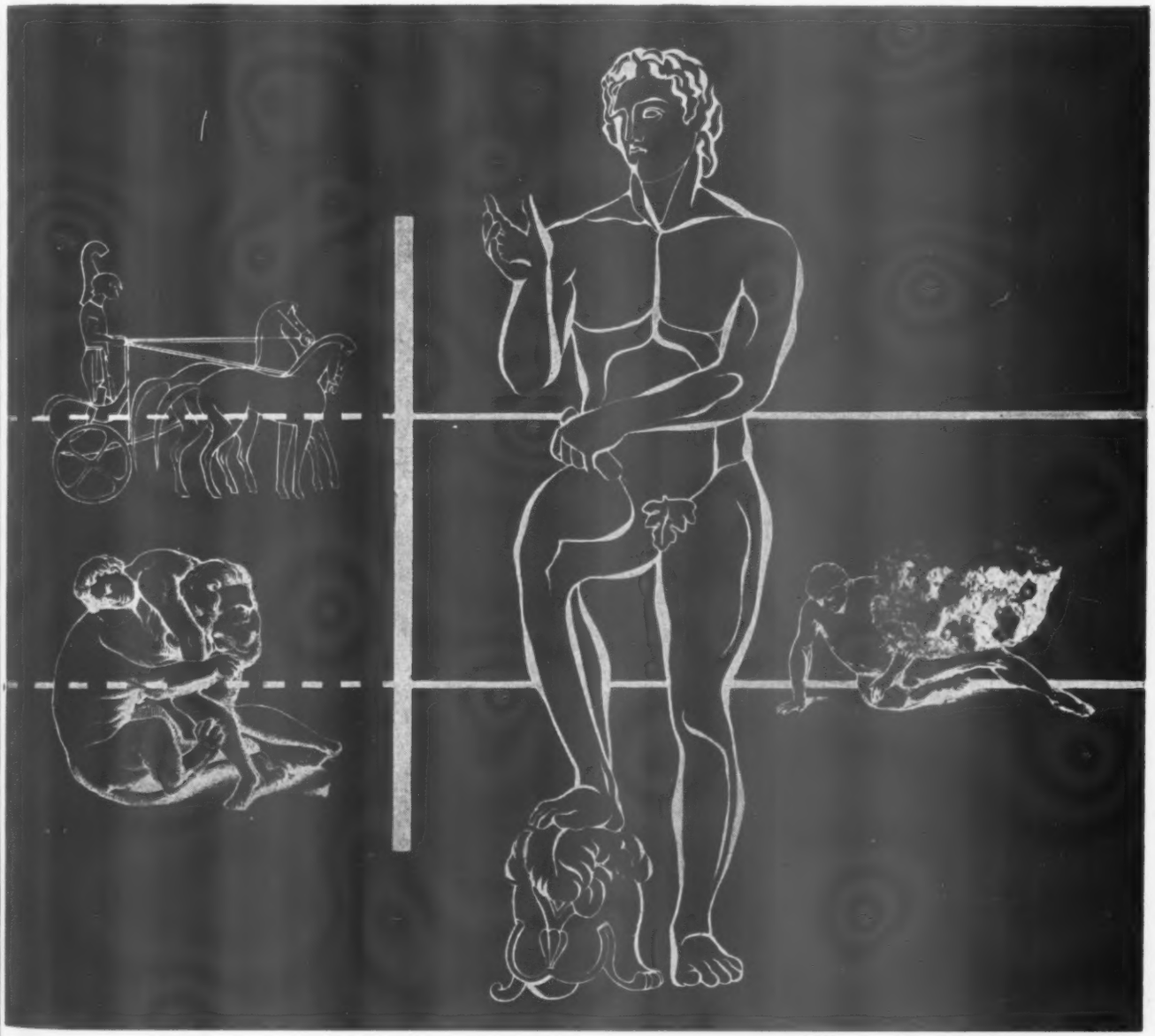
L. C. HOLLIEN

GOTTFRID OLSON

IT TAKES MORE THAN MUSCLE

According to legend, Polydamas, the Greek athlete, killed a lion with his bare hands, stopped a chariot in full flight, and lifted a raging bull off the ground with ease. His career, however, came to a spectacular end when he tried to catch a huge falling rock.

Today, sudden loads end the life of many cast steel parts. Low temperatures, for instance, can have a depressing effect on the impact strength of steels. Molybdenum steels, which combine deep hardening and freedom from temper brittleness, reduce this risk.



MOLYBDIC OXIDE—BRIQUETTED OR CANNED • FERROMOLYBDENUM • "CALCIUM MOLYBDATE"
CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.

Climax Molybdenum Company

500 Fifth Avenue · New York City

MOLY

(*Continued from page* 128)
ciated with the company for many years and is well known in the material handling industry.

• • •

Norman J. Dunbeck, recently elected chairman of the Central Ohio Chapter of the AFA, is vice president, Eastern Clay Products Inc., Eifort, O. Mr. Dunbeck comes from a family of foundrymen and at 15 took his first foundry job, working during vacations through high school and college. He was graduated from Catholic University in 1924, as a chemical engineer, working for a time at the Donner Steel Co., Buffalo, and Symington-Gould Corp., Rochester, N. Y. He joined Eastern Clay Products in 1926 and was put in charge of research and tests, and later in charge of production. He then specialized in foundry sand service work for about 10 years. He was elected vice president of the corporation in 1938. Mr. Dunbeck has served as a member of the executive committee and various sub-committees of the Sand Research Division of the AFA. He was chairman of the membership committee when the Central Ohio Chapter was organized in December, 1944, and served as co-chairman last term.

• • •

Richard Vosbrink, newly elected president of the Northern California Chapter of the AFA, is owner of Berkeley Pattern Works, Berkeley, Calif. Mr. Vosbrink was born in San Francisco and attended the schools of that city, later enrolling in evening courses at Humboldt Technical School and extension courses with International Correspondence Schools and University of California. He served his apprenticeship as a patternmaker with California Pattern Works, San Francisco, and in 1910 became associated with the Hall Scott Motor Car Co., Berkeley, as a draftsman and designer, specializing in automotive design. He later became chief engineer there but resigned in 1920 to form his own pattern business, Berkeley Pattern Works. Mr. Vosbrink has been active in the Northern California Chapter since 1937, serving as a director and publicity chairman and during the last term as vice president.

• • •

R. J. Rice, recently released from the Navy with the rank of lieutenant-commander, has joined the staff of the International Nickel Co., New York, to establish the Texas technical section of its Development and Research Division, with headquarters in Houston, Tex. Mr. Rice was associated with the Beaumont Iron Works Co., Beaumont, Tex., from 1933-1938, responsible for operations of its metallurgical and heat treating departments, melting shop, and specifications for steels and irons. Later he became foundry engineer and metallurgist, Metal Goods Corp., Houston, Tex. In 1942 Mr. Rice was appointed senior industrial specialist in the manganese - chrome branch of the War Production Board and in October of that year was commissioned as a lieutenant (jg) in the Navy assigned to the Office of Procurement and Material, Material Division, with additional duties on the staff of the Army-Navy Munitions Board. He later was assigned to the Navy Department Operating Petroleum Facilities, 9th Naval District.

• • •

O. H. Rosentreter, since 1943 assistant sales manager, National Engineering Co., has been appointed foundry engineer for the West coast. Mr. Rosentreter was a member of the engineering department for a number of years, later transferring to the sales department where he became assistant sales manager. He will make his headquarters in Los Angeles, and will handle foundry engineering work in California, Washington, Oregon and Utah, working with local representatives on the West coast.

Karl W. Mueller has been appointed plant manager of the Reading-Pratt & Cady Division, Reading Steel Casting Division and d'Este Division of American Chain & Cable Company, Inc., at Reading, Pa. Formerly manager of the Standard Stoker plant at Erie, Pa., Mr. Mueller is a graduate of mechanical engineering at Cornell University and received a masters degree from the Stevens Institute of Technology, Hoboken, N. J. He is a director of the Read Machinery Co., York, Pa.

• • •

James W. Park, formerly a molding foreman at Columbus Malleable Iron Co., Columbus, O., has joined Cureton Casting Co., Mt. Vernon, O. Mr. Park entered the foundry industry in 1940 as a molder at the Columbus Malleable Iron Co. Other connections include Kilgore Mfg. Co., Westerville, O., and Miller Foundry Co., Columbus, O.

• • •

Col. John Slezak, formerly chief of the Chicago Ordnance District, has been awarded the Oak Leaf Cluster to the Legion of Merit, for his service in directing the procurement program of the Chicago district during the war and contract terminations after victory. Called to duty shortly after the outbreak of war, he became Chicago district chief in June, 1944, and after military retirement he returned to the presidency of the Turner Brass Works, Sycamore, Ill., early this year.

• • •

John McBroom and **Harvey W. Kutchera** have formed a partnership, Stainless Foundry & Engineering Co., Milwaukee, for the production of stainless steel castings. Mr. McBroom was graduated from University of Minnesota. Previous connections include Duraloy Co., Scottdale, Pa.; Pittsburgh Lectromelt Furnace Corp., Pittsburgh; Whiting Corp., Harvey, Ill., and Hydro-Arc Fur-

(*Concluded on page* 162)

NORMAN J. DUNBECK

RICHARD VOSBRINK

R. J. RICE

O. H. ROSENTRETER

MCA HAS A LONG REACH

The extraction, reduction, and refining of Molybdenum and Tungsten have been the principal business of the Molybdenum Corporation of America for thirty years. More recently, MCA has become a supplier also of other alloying materials.

Mining and ore reducing operations on its own extensive properties represent by no means all of the Corporation's output. It has become a processor and distributing agency for other widely known concerns, handling metallurgical materials from remote sources in both hemispheres.

MCA competence includes, and MCA interests embrace, much more than can be described in one advertisement. The organization and facilities of the Corporation make it possible to meet special requirements. Correspondence is invited.

AMERICAN Production, American Distribution, American Control, Completely Integrated.

Offices: Pittsburgh, New York, Chicago, Cleveland, Detroit, Los Angeles, San Francisco, Seattle.

Sales Representatives: Edgar L. Fink, Detroit; Bromley-Donaldson Co., Los Angeles, San Francisco, Seattle.

Subsidiaries: Cleveland-Tungsten, Inc., Cleveland, O.; General Tungsten Manufacturing Co., Inc., Union City, N.J.

Works: Washington, Pa.; York, Pa.

Mines: Questa, New Mexico; Yucca, Ariz.; Urad, Colorado.

MOLYBDENUM **CORPORATION OF AMERICA**

GRANT BUILDING **PITTSBURGH, PA.**

MCA

(*Concluded from page 130*)

nace Corp., La Grange, Ill. Mr. McBroom was vice president and general manager of Hydro-Arc Furnace Corp., when it was acquired by Whiting Corp., in 1943, and was retained by Whiting as sales manager of a new electric furnace department which it organized. He resigned in 1945 and opened an office in Chicago as consultant on electric furnace problems Mr. Kutchera, a graduate of University of Wisconsin, was associated with Kimberely-Clark, Neenah, Wis., Chain Belt Co., Milwaukee, Waukesha Motor Co., Waukesha, Wis., for a time, and later was a consulting engineer.

♦ ♦ ♦

Reginald T. Wheeler, Jr., has been appointed sales manager of Metal & Alloy Specialties Co. Inc., Buffalo, N. Y. Mr. Wheeler, a graduate of Harvard University, was recently released from the Navy with the rank of lieutenant commander, after serving five years in the Pacific. Since that time he has been in the sales department of the Metal & Alloy Specialties Co. Inc.

♦ ♦ ♦

Claude S. Humphrey, elected chairman of the Quad City Chapter of the AFA for the year 1946-47, is owner of C. S. Humphrey Co., Moline, Ill. Mr. Humphrey was born near Macomb, Ill., and attended public schools and business college in Moline. He spent four years as assistant cashier in a public utilities company and a year in charge of the office of an electrical contracting company. In 1920 he joined Westco-Chippewa Pump Co., Davenport, Iowa. During the 16 years he remained there he was secretary and assistant treasurer and had charge of the operation of the foundry during the last eight of those years. In 1936 Mr. Humphrey started his own company where iron, bronze and aluminum were poured until 1945 when the iron and bronze facilities were sold and the plant is now an aluminum foundry only. An active member of the Quad City Chapter, he served as its vice chairman last term.

♦ ♦ ♦

John F. Smith, newly elected chairman of the Saginaw Valley Chapter of the AFA, is general foundry superintendent, Chevrolet Gray Iron Foundry, Saginaw, Mich. Mr. Smith was graduated from Culver Military Academy in 1920 and attended New York University for two years. He entered the foundry industry as a coremaker at the former Central Foundry, Saginaw, now Chevrolet Gray Iron Foundry. In 1923 he was appointed foundry foreman, in 1930 general foreman, and in 1935 night superintendent. From 1942-45 he was superintendent in charge of magnesium and was appointed general foundry superintendent last year. Mr. Smith was one of those instrumental in organizing the Saginaw Valley Chapter in 1945, and served as one of its original board directors. Last year he was vice chairman of the organization.

♦ ♦ ♦

Ira Cole has been elected director and vice president of the Empire Varnish Co., Cleveland, and will manage sales of the company's Waterlox Division. Mr. Cole's industrial experience includes positions as master mechanic, Columbiana Butter Co., and later as superintendent of the Lima Engine & Mfg. Co. He was manager of the American Road Machine Plant, Delphos, O., following which he entered the building material field as a supervisor. Since 1932 he has been engaged in the research and technical promotion of Waterlox products and his successful promotion of these sales resulted in his present position.

♦ ♦ ♦

John W. Baer has been appointed chief engineer, the Forker Corp., Cleveland. Mr. Baer is a graduate of the engineering college of Cornell University and served three years in the Army Engineers with the rank of captain. His industrial engineering work has been exclusively in the material handling field, covering the design of equipment and manufacturing production. Before entering the Army, Mr. Baer was tool engineer and chief draftsman for the Forker Corp.

♦ ♦ ♦

Quentin D. Mehrkam, until recently production metallurgist, Thompson Products Co., Cleveland, has joined the metallurgical staff of the Ajax Electric Co., Philadelphia, where he will be engaged in the development of new processes and experimentation in connection with heat treating manufacturers' specimen work in the company's research laboratory.

♦ ♦ ♦

Ralph R. Newquist has been elected vice president in charge of sales of Roots-Connersville Blower Corp., Connersville, Ind. A graduate of Pennsylvania State College, Mr. Newquist had been employed successively by the Reliance Electric & Engineering Co., Louis Allis Co. and Allis-Chalmers Mfg. Co.

♦ ♦ ♦

Thomas B. Belfield has been elected president and general manager of a new corporation which has purchased the Cochrane Brass Foundry, York, Pa. **Ralph F. Fisher** has been named vice president, **K. L. Dietz,** secretary, and **James T. Duffy Jr.,** treasurer.

♦ ♦ ♦

Harry Ensminger has been named to head the new fire protection department recently instituted by Mathieson Alkali Works Inc., New York, to handle both high and low pressure carbon dioxide equipment. Mr. Ensminger has been associated with the company since 1945.

♦ ♦ ♦

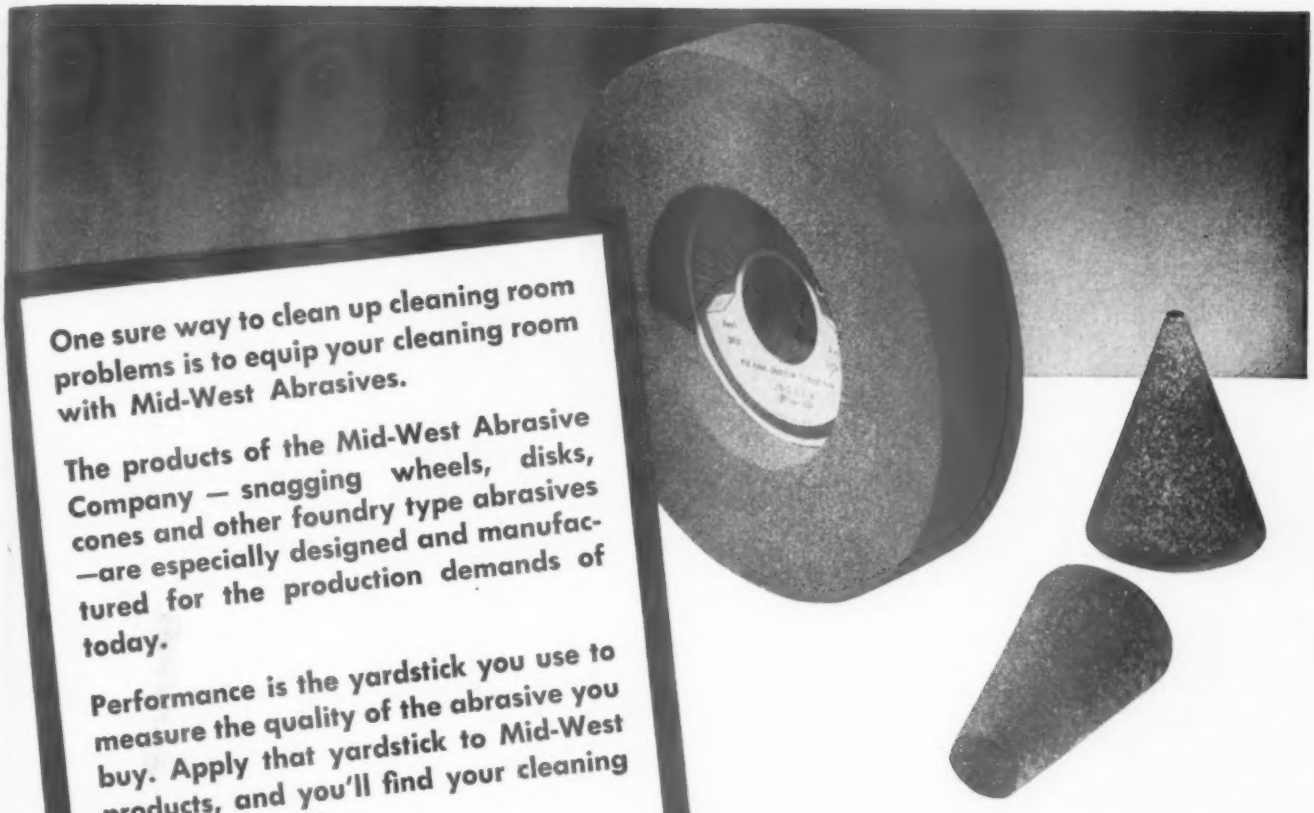
Hiram Brown has been appointed chief metallurgist of Solar Aircraft Corp., Des Moines, Iowa. He previously served in the same capacity in the Solar Precision Casting Division of that company.

REGINALD T. WHEELER JR.

CLAUDE S. HUMPHREY

JOHN F. SMITH

IRA COLE



One sure way to clean up cleaning room problems is to equip your cleaning room with Mid-West Abrasives.

The products of the Mid-West Abrasive Company — snagging wheels, disks, cones and other foundry type abrasives —are especially designed and manufactured for the production demands of today.

Performance is the yardstick you use to measure the quality of the abrasive you buy. Apply that yardstick to Mid-West products, and you'll find your cleaning problems solved.

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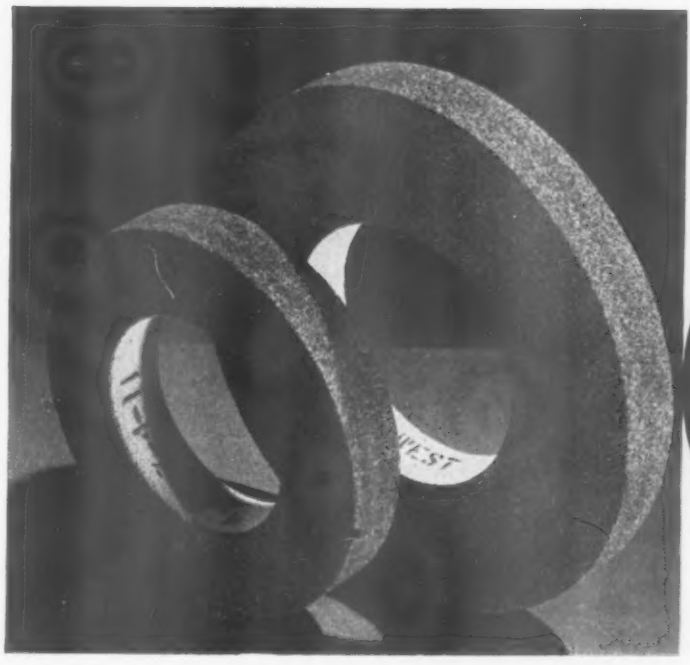
CLEAN UP WITH MID-WEST ABRASIVES



MID-WEST ABRASIVE CO.

Manufacturers of DEPENDABLE Abrasives

OWOSSO, MICH. • DETROIT

ROCHESTER, PA.

Around DETROIT

By A. H. ALLEN
Detroit Editor, The Foundry

Motor capital host for 1947 AFA convention . . . . Critical raw material shortages hamper operations . . . . New system for testing cylinder blocks and heads for leakers

FOR THE first time since 1936, the motor capital will play host to the national convention of the American Foundrymen's Association next April 29 through May 2. Expected to attract well over 2000, the event will feature four days of technical sessions, plant visitations and other special attractions, but no exhibit of materials and equipment; the latter now being scheduled only every other year.

Technical program will be of unusually high caliber, and it is being co-ordinated carefully under the expert direction of S. C. Massari, A. F. A. technical director. Committees representing several divisions of the foundry industry (or should it be "castings" industry?) already have held meetings preparatory to organizing technical papers for presentation at the 1947 convention. By next spring, current programs of expansion and modernization in several of the large automotive foundries in this area will have been completed, making exceptional show-places for those interested in studying the operations of mass-production gray iron foundries of the highly mechanized type.

Expect Peace

Most opinion tends to the belief that in six months much of the unsettlement and unrest now prevalent in the industrial situation will have calmed to the point where visitors to Detroit will be able to get a true picture of automobile manufacturing at its best. Certainly that is not true now, whether you are talking of foundries, machine shops, press plants or assembly lines. Continuing critical shortages of pig iron, scrap and a dozen other materials are making efficient operation of castings plants impossible. High absenteeism, excessive labor turnover and low productivity are further problems which remain paramount even 14 months after the end of the war.

So acute is the pig iron situation that even the presidents and general managers of some of the automotive companies personally are touring the country seeking to find iron tonnage for their foundries. Many of the noncaptive melters are operating on restricted schedules—perhaps only two or three days a week—and instances are reported of orders for castings being made contingent upon the buyer furnishing pig iron or scrap, commodities moving these days under the weirdest assortment of tie-in, under-the-counter and reciprocal deals imaginable.

Blast Furnace Out

To make matters still worse, Ford Motor Co. had the misfortune to see one of its two blast furnaces burn through a lining late in August, necessitating a shutdown until Oct. 1 or thereabout and meanwhile depleting pig iron production at the Rouge plant by about 700 tons a day. This iron is needed sorely by both open-hearth and foundry departments and until the damaged furnaces can be blown in a reduction in steelmaking operations—30 per cent initially—was the only alternative. A further slash in schedules could be avoided only by stepping up the use of scrap, and the Ford scrap piles are at low ebb. In addition, some iron was being supplied to outside foundry sources, and how long this could be continued seemed problematical.

A growing but often unrecognized weakness in foundry operation, particularly the larger automotive foundries, is the disaffection among supervisory forces at the foreman and assistant foreman level, and in some cases in even higher echelons. These men are finding themselves squarely in the middle between truculent union labor, which in foundries is usually of the more virulent type, and top management which drives for more production and better discipline and blames lower supervision if these ends are not met. At the same time, if union workers push their petty grievances up beyond lower supervision, top management is all too prone to accede to such demands in the interests of peace, thus short-circuiting lower supervision and causing a serious loss of face which does these supervisors no good in later dealings with workers.

Many of these middle men, with 10, 15, even 20 years of experience in foundry work, and the best possible candidates for elevation to higher management positions, are giving up in complete mental and physical exhaustion, and turning to other lines of business. One specific case is that of a Ford supervisor, with 18 years of foundry experience, who could stand the pressure no longer and resigned to join his father in the tailoring business.

Stop Gaps Unsatisfactory

This is a situation which is bound to create serious gaps in the management ranks sooner or later. Where gaps have appeared, they have often been filled by the worst sort of expedients such as bringing in men to responsible foundry positions who have never even been inside a castings plant before and whose only experience may have been in, say, aircraft or aircraft engine manufacture. This only creates more friction and resentment among the old-line foundry supervisory staffs, and more resignations.

Probable explanation is that in too many integrated plants, the foundry is tolerated as a necessary evil and is not recognized as a vital cog in the manufacturing picture. Transferring a man from one department to the foundry is likened to transferring a city patrolman to the "sticks" as a form of punishment.

No more proof of the matter is needed than to talk with salesmen whose work involves regular calls on foundry supervisory personnel. They say the turnover and job transfer rate in some large shops is so rapid that with each call they must make out completely revised personnel lists. As indicated previously, the problem extends upward into foundry management ranks. There is a definite deficiency in both quantity and quality of personnel capable of assuming effective management and operation of the larger foundry units.

* * *

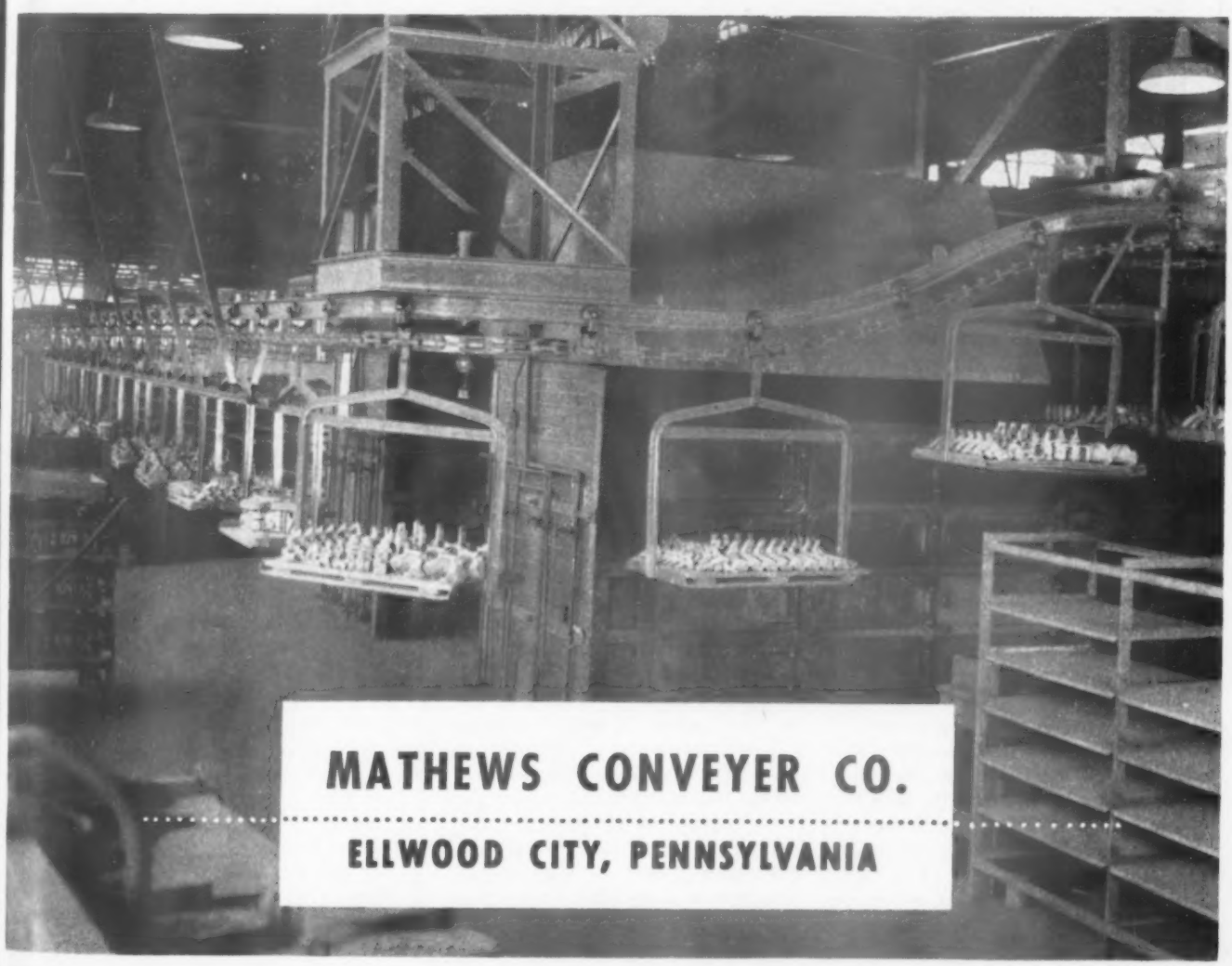
Defiance, O., was selected as the location for the new gray iron foundry of the Central Foundry Division of General Motors, partly on the basis of this city showing 3126 applicants for jobs, against 2625 from the Tiffin, O., area. The fact that the former city had 501

(*Concluded on page* 136)

Handling Problems Deserve SPECIAL Attention

EVERY manufacturer, in striving to keep costs at a minimum, must deal with more or less difficult material handling problems. These are not always quickly solved, and usually require considerable thought by plant and conveyer engineers. Most experienced plant engineers agree that the use of Mathews methods and Mathews equipment means efficient material handling. That is why Mathews Engineers are usually called in on the problem requiring special attention. There are many types of Mathews Conveyers of both gravity and power designs, and from these types are selected the units which make up Mathews continuous flow conveyer systems. It is with such systems that prominent manufacturers are reducing worker fatigue and keeping materials moving through processing machinery, storage and shipping, with a minimum of product re-handling, costly confusion and delay.

It might be that a Mathews Engineer can show you what others in your industry have done to improve their material handling. We will welcome your inquiry and give it prompt and thorough service.



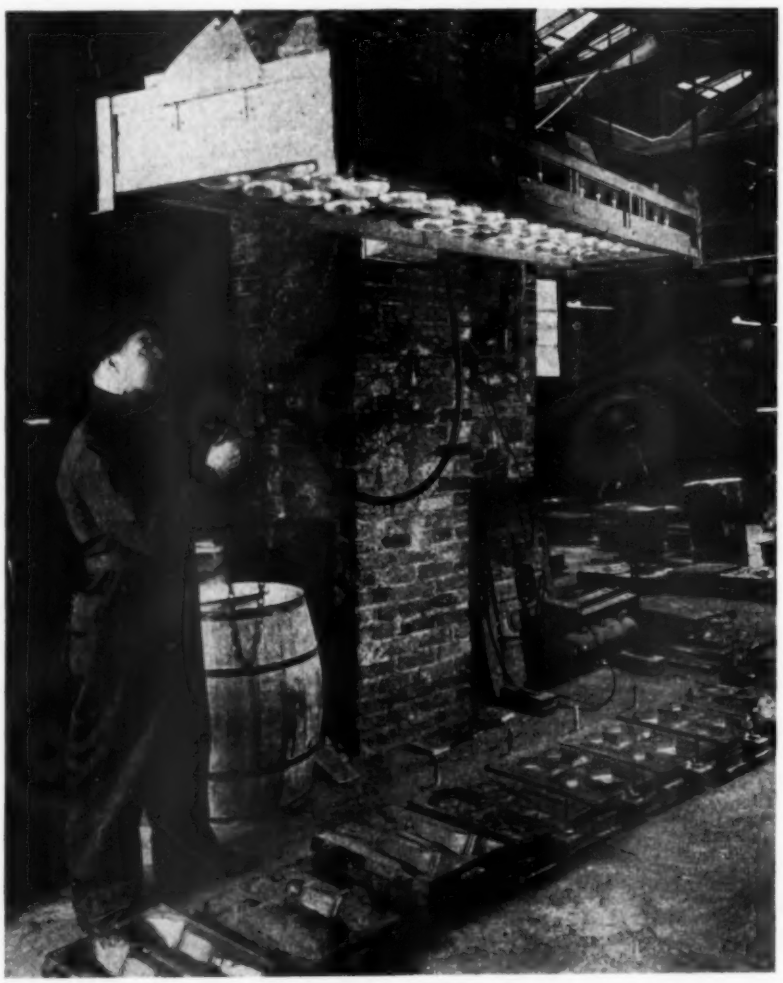
(*Concluded from page* 134)

more job applicants was not the sole determinant, since both cities showed more than the required 2000 to staff the plant. The decision was based on which area could best supply the necessary labor without disturbing community life in general, other manufacturers, and the local transportation system. It is hoped that ground can be broken this month and the plant completed by April. First orders for equipment have come through, including cupolas, charging equipment conveyors and related facilities.

Latest planning of the major automobile companies calls for completion or runout of their 1946 models some time this year between Thanksgiving and Christmas, to be followed by a brief retooling period for a "facelifting" treatment to create 1947 models which should be on most assembly lines by January or possibly before. The 1947 model will in a sense be an interim one since it probably will be discontinued late next summer and a changeover effected to 1948 models, the latter incorporating major design and engineering changes.

Testing equipment for leakers in cylinder block and head castings at the Ford motor building has been revised to make use of air instead of water. The machines were designed by company engineers and in operation simultaneously seal all orifices, pump 30 pounds air pressure into the piece, then immerse and rotate the casting slowly for several seconds in a water tank. Possibility of rust is minimized by the addition of inhibitor to the water. The test machines handle 60 pieces per hour, compared with 40 pieces in the former water test machines.

MOLDS SKIN-DRIED BY INFRARED



INFRARED is employed by the Modern Brass Foundry Co., Philadelphia, for skin-drying molds in the manner illustrated here. Equipment used consists of a bank of lamps, together with the necessary hoisting and electrical control equipment. Molds measuring 12 x 18 x 6 in. are lined up on the floor, and the infrared unit is lowered over them until the legs on the four corners of the bank rest on the floor. In that position the lamps are 4 in. above the top of the flasks. From the time the lamps are turned on, only 15 minutes are required to skin-dry the molds to a depth of ¼ to ½-in. The molds are used for casting brass or bronze, although equally good results are said to be obtained in drying molds for casting ferrous metals.

The installation cost approximately $500, one-half of this representing cost of the infrared components and the balance being spent for special fabrication work to raise and lower the unit, magnetic contactors, push-button controls, etc. The unit is equipped with 375-w lamps, the entire bank pulling 18 kw. Operating cost for electricity is estimated at about 72c per eight-hour day, this allowing 15 minutes for lining up the flasks, moving the infrared in position, etc., and 15 minutes for the actual drying operation. The infrared equipment was furnished by the Fostoria Pressed Steel Corp., Fostoria, O.

Superior Foundry Co. In New Hands

Superior Foundry Co., 3542 East 71st St., Cleveland, has been acquired by a new organization, Superior Foundry Inc., with Walter L. Seelbach as president and general manager. Mr. Seelbach formerly was secretary-treasurer of Forest City Foundries Co., Cleveland. Other officers of the new company are: Vice president, Charles F. Seelbach; secretary-treasurer, Philip Frankel, and assistant secretary, Irene Grentzer. The company will continue the production of gray iron castings, with no major changes planned in operating personnel. George J. Feiss, formerly president of the Superior Foundry Co., will remain in a consulting capacity.

Steel Foundry Sold To Bettendorf Co.

The government-owned steel foundry of Ordnance Steel Foundry Co., Bettendorf, Iowa, operated under lease during the war by Campbell, Wyant & Cannon Foundry Co., has been sold by WAA to the Bettendorf Co. Price paid is $1,200,839, including $151,000 for raw materials in the plant. Thus the plant returns to the hands of the company which built and operated it for many years in connection with its railroad car and equipment manufacturing business.

Earlier this year, the Ordnance Steel foundry was sold by WAA to American Steel Foundries, Chicago, but the transaction was subsequently nullified by a ruling of the antitrust division of the Justice Department holding that such would violate antitrust laws.

DANGER! Luxury at work!

THIS MAY NOT SEEM TO BE A LUXURY. **But every time you use a bar or any other manual tool to free your castings . . . it costs you money! It costs you time! It costs you production! Yes . . . a bar is a luxury!**

BUT WHEN ROBINS FLOATEX SHAKEOUTS ARE PUT TO WORK—

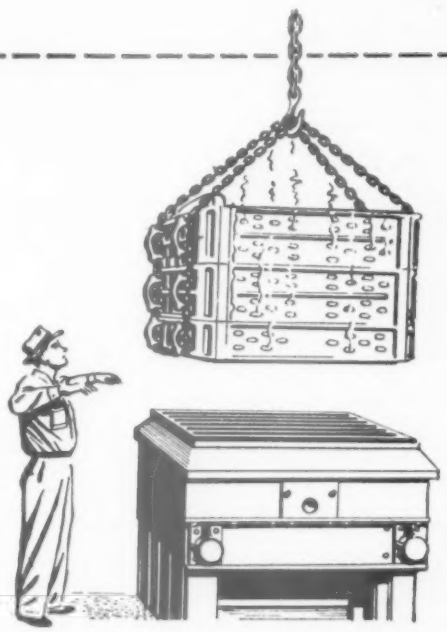
They do your job cheaper. They're "Job-Engineered" to free *your* castings . . . at *your* specific production rate.

They do your job faster. They bounce tons free in minutes, not hours.

They do your job better. They shake the flask, not the building. Flasks and castings are shaken free without injury.

Yes . . . you'll find it pays to check with Robins first! Remember, there's a portable or standard Robins Floatex Shakeout designed for *your* job.

ROBINS
FLOATEX SHAKEOUTS



"Job-Engineered" to Solve Your Problem
CHEAPER . . . FASTER . . . BETTER

Robins Conveyors Incorporated, Passaic, New Jersey — Division of Hewitt-Robins Incorporated

Foundry DEVELOPMENTS

MEMBERS of the Foundry Practice Subcommittee, Steel Castings Research Committee of the Iron and Steel Institute (Great Britain) studied the influence of pouring speed on the manufacture of steel castings, and in a report entitled "Manufacture of Some Thin-walled Steel Castings With Notes on the Influence of Pouring Speed" give short accounts of molding and foundry procedures used at seven foundries. Five of the foundries made bomb casings and two made rear axle housings. With bomb casings least difficulty was met when the molds were filled quickly, and also less trouble was encountered with hot steel. There was considerable scabbing with very slow pouring or with very cool steel. High rates of pouring also reduced the number of rejections due to hot tears, pulls and other defects such as sand inclusions. Casting temperatures above 1580 C give better results than temperatures below 1550 C. With axle housings satisfactory castings were made over a wide range of pouring speeds, but it should be noted that the casting temperatures were available for only one foundry.

• • •

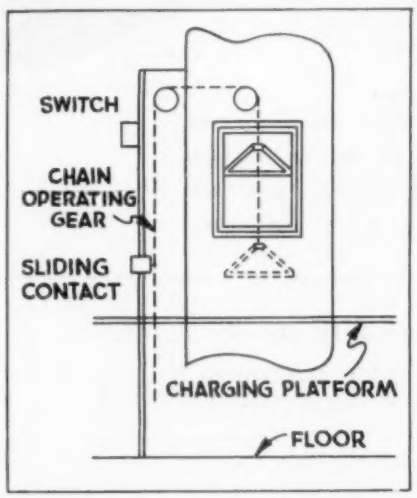
NEW magnetic-field gage which indicates the relative strength of the magnetic field in parts which are being examined for flaws by the magnetic-particle method has been developed by General Electric Co. The new instrument is said to be especially useful for testing large castings and forgings in which it is difficult to calculate the field intensity at various points from the current passed through the part and the cross-sectional areas. The instrument measures both alternating and direct current field strength. Small and portable, it can be used wherever 115 v, 60 cycle power is available. It consists of a gage head which is permanently attached to a field strength indicating unit.

• • •

TWO NEW techniques for electrolytic metal polishing which were developed at the Frankford Arsenal, Philadelphia, during the war are described in a report available through the Office of Technical Service, Washington 25. One involves the use of a portable brush electrode for polishing individual areas of heavy and cumbersome objects which do not lend themselves to mechanical treatment or to electrolytic polishing in a tank. The other for polishing metallographic specimens involves the use of a stationary lapping disk moistened with the electrolyte. The object to be polished is made the anode and moved over the disk. Report is PB-4052; photostat $2; microfilm 50 cents.

• • •

METHOD of determining the stock level in a cupola as described in a paper by T. H. Taft and H. A. Hallett and presented at the annual meeting of the Institute of British Foundrymen is shown



in the accompanying illustration. In operation a weight attached to a chain operating over pulleys is placed in position on top of the stock column and after reaching a predetermined level contacts a switch which shows a light on the platform to tell the charger there is room for another charge. At the same time, a second light indicates to the tapper-out that a charge of molten metal is ready in the well.

• • •

WHILE not a new item, production has begun again on magnesium bakers' peels. It is 8 x 33 in. and produced by die casting. Used by bakers for loading and unloading various types of baked goods from ovens, the magnesium peel is claimed to possess numerous advantages. It is lighter, stronger and lasts much longer than the wooden peels. The magnesium peel seems to have just the right amount of "stickiness" under oven heat to cause the baking pans to adhere to the blade.

• • •

DESIGNED for application in the glass, chinaware and enamelling industries, it appears that a porcelanite developed by a Pittsburgh firm might have other applications where it is desired to prevent scaling of cast iron and steel parts. The material may be sprayed or applied with a brush and after heating forms a semiglaze, porcelain-like finish. The material also may be applied to brick or clay.

• • •

SILVER-MAGNESIUM solder capable of withstanding temperatures as high as those found inside jet turbines was developed in Germany during the war according to a report on sale by the Office of Technical Services, Department of Commerce, Washington 25 (PB-23086; photostat $1; microfilm 50 cents). The solder is composed of 85 per cent commercially pure silver and 15 per cent magnesium. Addition of magnesium in that proportion to silver gives the alloy excellent soldering properties without lowering the melting point of the silver. The solder has a melting point of 1790 F and retains its high strength at temperatures up to 850 F.

• • •

PRINTED copies of Simplified Practice Recommendation R183-46 on brass or bronze valves are now available, according to the Division of Simplified Practice, National Bureau of Standards, Washington 25. The recommendation applies to gate, angle, globe and check valves, and for each kind and type a simplified list of sizes and corresponding service ratings is given. Primary ratings range from 100 to 350 psi. Water, oil and gas ratings of 1000 and 2000 lb and higher, together with the size ranges for certain kinds of those valves are included. Recommendation was effective Sept. 1, 1946.

• • •

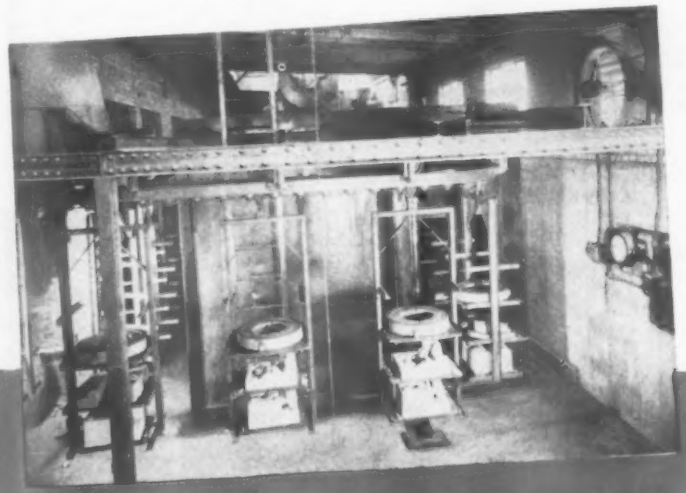
LATEST development in hot blast cupola is that described by the inventor E. Longden, in a paper presented at the annual meeting of the Institute of British Foundrymen. Unit uses an external heater employing two fireboxes which are replenished with fuel alternately. Gases of combustion heat the blast to the cupola but are kept from uniting with the blast. At the cupola a double box tuyere permits the entry of the heated blast and the hot gases of combustion from the heater through separate tuyeres. Comparative test with an identical cupola using cold blast showed slightly over 2 per cent saving of coke, and an increase of over 17 per cent in hourly melting rate.

Building
INDUSTRIAL OVENS and FURNACES
for 53 years
has been our business

MAEHLER'S leadership in developing the recirculating air heat system for industrial ovens and furnaces has been recognized throughout industry for many years. The Paul Maehler Company has pioneered in this type of heating, the result of 53 years of experience which spans all of the methods from a coal stove in an oven serving bicycle refinishers to the complex systems of the present day.

Tests show that Maehler-engineered recirculating air-heat furnaces maintain temperature uniformity that is *virtually perfect!* This kind of temperature control assures the user of lower operating costs, greater production and more satisfactory results.

Regardless of what your requirements are . . . heat treating, core baking, enameling, etc. . . . Maehler engineers can help you design an oven, furnace or complete system to meet your needs.



These two photos show typical Maehler installations. The one above is a Maehler air-draw furnace at Chambers, Bering Quinlan Co. It is used to anneal gray iron castings. The installation at the left is a Maehler continuous monoveyer core baking oven, with Palmer-Bee conveyor, at the Howard Foundry Company. The cores are baked 2½ hours at 450° F.

Industrial Ovens and Furnaces for Core Baking, Mold Drying, Heat Treating, Enameling, etc.

MAEHLER

THE PAUL MAEHLER COMPANY
2200 W. Lake St. • Chicago 22, Ill.

Reducing Cleaning Shop Costs

By H. A. REECE
Meehanite Metal Corp.
New Rochelle, N. Y.

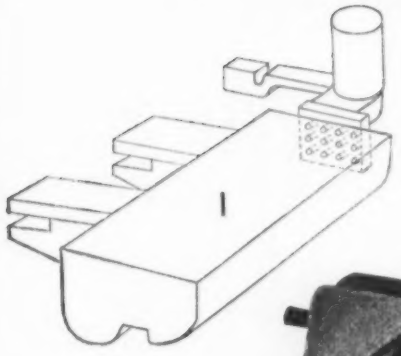


Fig. 1—Toggle block weighing 755 lb, showing Meehanite system of gating into riser. Time saved in removing riser was 53 minutes

Fig. 2—Mold for casting 2450-lb die, showing use of refractory-coated screen at junction of riser

THE BOTTLE-neck of the average foundry today frequently is the cleaning shop. This is equally true of steel, bronze and gray iron, and particularly where the castings are fairly large.

Removal of risers is possibly one of the chief factors in causing cleaning shop congestion. It involves not only the use of the machine tool, torch cutting or grinding equipment, but represents one of the costliest and time-absorbing operations involved in preparing castings for shipment.

Much can be done to help this problem by giving consideration to the method of molding and to the gating system in relation to directional solidification. However, the application of risers of generous dimensions to replenish the shrinkage which occurs as the molten metal passes from the liquid to the solid condition are often necessary. This means the removal of large masses of metal from castings which is a costly procedure.

During the past few years the Meehanite Metal Corp. has given special study to this subject and through the

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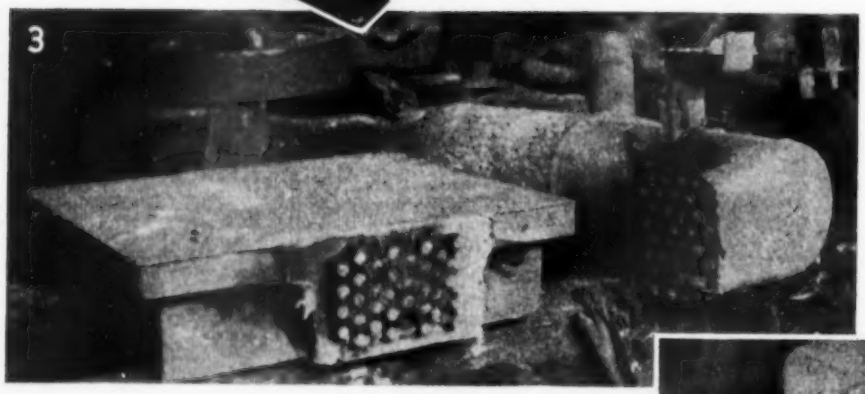
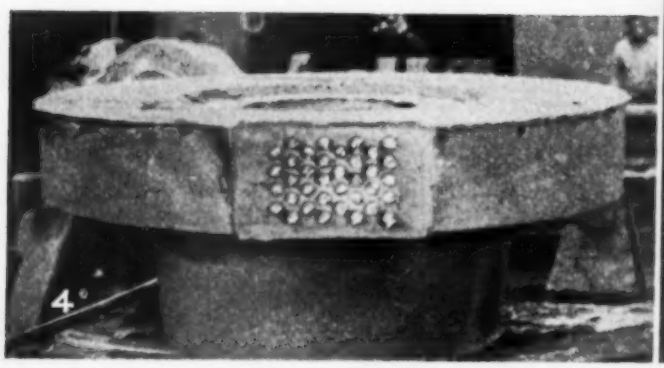


Fig. 3—Cast die weighing 2450 lb, with riser removed. Use of this type riser reduced cleaning time from 45 minutes to 23

Fig. 4—This 2800-lb coupling required 92 minutes for cleaning when fed with standard riser. With Meehanite riser time was cut to 47 minutes

Fig. 5—Machine base, weight 2000 lb, was cleaned in 57 minutes, 58 minutes less than when fed with standard riser



GEM-SET DIAMOND CUT-OFF WHEELS

"THRRRIFTY"

Gem-Set wheels have been especially developed for economically cutting quartz, glass, tile, ceramics and all types of hard, brittle, non-metallic materials. The diamonds are anchored with such security that considerably higher surface speeds are now possible, offering *FASTER*, more *ACCURATE* and *COOLER* cuts.

The initial low cost of Gem-Set wheels should be investigated. Send for new folder, which includes prices and a list of materials suitable for cutting.

BAY STATE

Top Performance Consistently Duplicated

Bay State Abrasive Products Co., (Canada) Ltd., Brantford, Ontario, Canada.

MAN-TO-MAN on the Molder's Bench

"Shop Hands of Note"

By RALPH L. LEE

SOME of my best friends have told me confidentially that I'm considered to be an old maid when it comes to housekeeping in the rooms where I hold foundry and factory meetings. Maybe they're right, but just the same I go right on insisting that floors be swept clean, chairs placed in orderly rows, ash trays conveniently located, blackboards black and the place cleared of junk. Not only this, but in a series of meetings, of two or more a day, the room has got to be readied up between each session.

Some time ago in a factory where I was putting on a series of *Man-To-Man* meetings, an old man was assigned by the management to cater to me in this old-maid housekeeping obsession of mine. In spite of his creaky joints, the old fellow did such a swell job that I went to him just before the opening of a session and said, "I want to thank you for the most spick-and-span room I have ever spoken in. In fact, I would like to know your name, mine is Ralph Lee." To which he replied, "Hi Doc, I know you, I heard about you before you came." "That's fine," I said, "but now I want to know you." Then he said, "My name's MacPharland, but Doc, just call me Mac."

Then his face lit up when he said, "I'm a boilermaker by trade, never lost a day till I retired, but with the war on I thought I'd better come back and help. Glad I did; the folks 'round here have been fine to me, even though I just sweep and clean." Then he straightened up and threw out his chest, "Doc," he said, "I own my own home and it's all paid for long ago an' I got four boys; they all went to engineering school and without a dime from me. One of 'em's right out here now in the engineering department and I hear he's doing darn good."

Feeling someone behind me I found the works manager listening to Mac and me. With no invitation he reached for Mac's hand and said, "Mac, I have seen you around but I didn't know *who* you were. I'm proud to know you." Just then Mac's foreman came in and he too shook hands with Mac. This was about all Mac could take so he said, "Folks, there's some chores I got to do, so if you'll excuse me I guess I got to run along." After he'd left and a short period of thoughtful silence, the manager said, "No sir, Doc, I didn't know *who* he was." And the foreman chimed in, "I didn't either."

I suppose I get in people's hair by my continual harping on the tremendous importance of the feeling between shop people to business success. But just the same I broke the silence by saying, "Without a doubt Mr McPharland is one of the most successful men I have ever met." And my companions backed me up with nods. "Do you know, folks," I went on, "I'd be willing to bet that scattered among the employees right out there in our plants are all kinds of distinguished people—writers, musicians, recognized authorities on gardening, stamp collecting, butterfly chasing and arrowhead gathering, Sunday school leaders, Boy Scout workers, counselors and political leaders."

I hope you won't think I'm laying it on too thick, but this little getting acquainted process with Mac took not over six minutes. Suppose we could work out a way where every individual in our plant was met and learned to be known and recognized for what he really is, as Mac is now known and recognized by us three, I believe I know what would happen. Production would automatically increase and scrap decrease.

While there wasn't a molder's bench in this plant they did buy a lot of castings. I can't see why the same idea wouldn't apply with a substitute of sand, flasks, ladles and cupolas for the materials and tools they happened to be using in this place I'm talking about.

(*Concluded from page* 140)

development of the Meehanite-Cameron core has rendered noteworthy economies.

This invention consists of the insertion of a feeder core between the neck and the riser separating the molten stream of metal into a plurality of separate streams spaced apart in a plurality of direction and surrounding each of the streams with an insulating material.

The feeder core may be made of core sand, firebrick, ganister or metal screen of suitable space openings coated with a refractory material. The refractory has the capacity for holding heat during the cooling of the casting, thus permitting free passage of molten metal from the riser to the casting as the latter solidifies slowly in the mold.

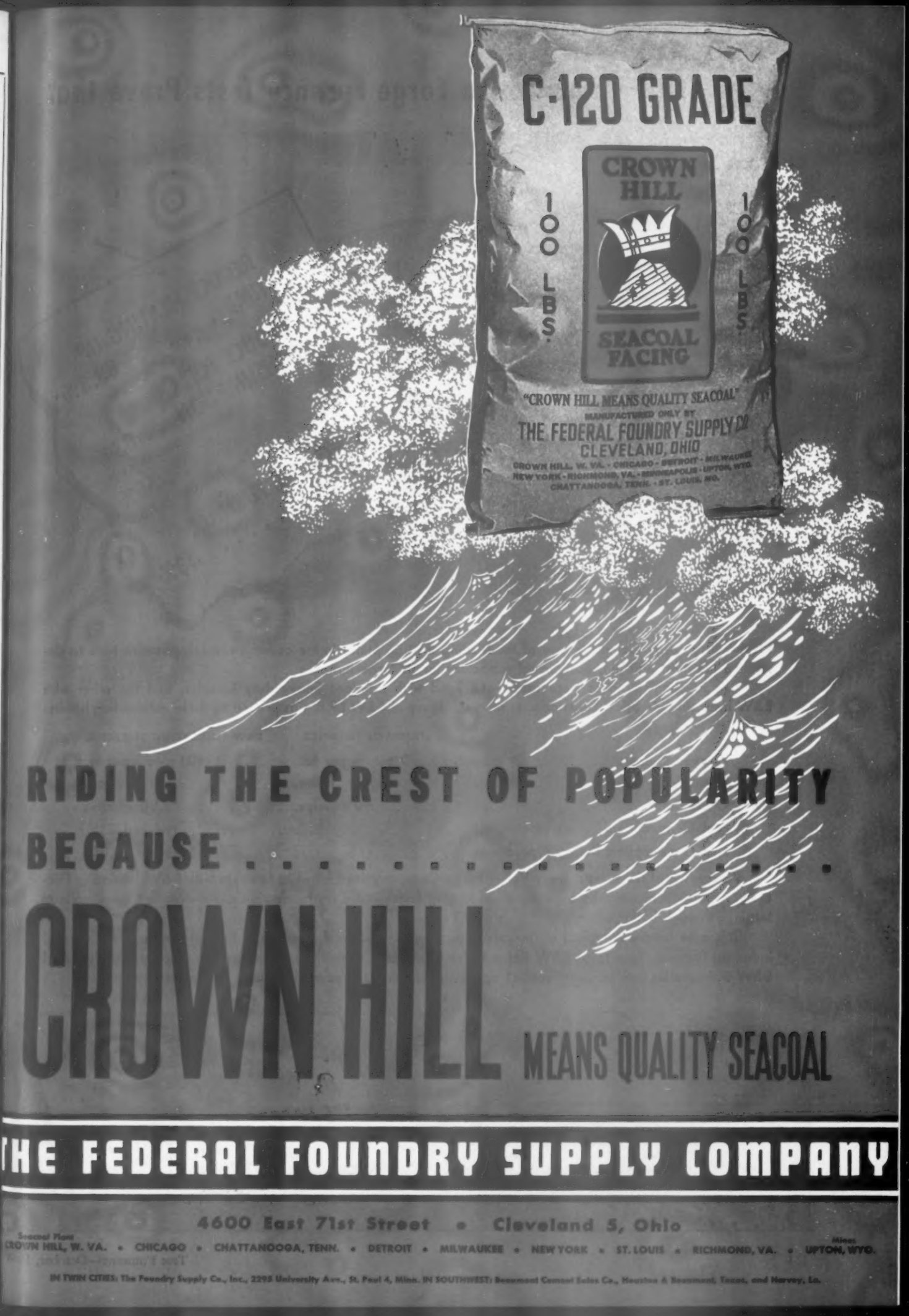
Figs. 1 and 2 show the application of this system to two different molds. Fig. 1 shows the use of the core plate, Fig. 2 the refractory-coated screen.

The main advantage of this system is, of course, the easy removal of the riser from the casting, either hot or cold, by a single blow from a sledge hammer, without fear of "breaking in" or damage to the casting. Cutting or burning are thus eliminated while much of the usual chipping and grinding is avoided.

Another advantage of this method of risering is that by removing risers immediately from castings after feeding is completed, savings are effected in subsequent blast cleaning.

The system may be applied to either side or top risers. Other of the accompanying illustrations serve as guides to the already established possibilities of this new foundry technique.

It is obvious that to be successful for both ferrous and nonferrous castings having differing shrinkage values on passing from the liquid to the solid condition that the size of the holes, the ratio of area of holes to neck of the casting and the area of neck of casting to riser must be properly dimensioned. Patent No. 2,313,517 covering the invention has been assigned to the Meehanite Metal Corp. which should be contracted concerning licensing rights.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Comparative Forge Furnace Tests Prove that

B&W INSULATING FIREBRICK . . .

REDUCE HEATING-UP TIME 83.3%
REDUCE FUEL CONSUMPTION . . 83%
during heating up
. . 50%
during operation
INCREASE FURNACE OUTPUT 43%

River Valley Forge Company, one of the leading forging plants in the country, ran comparative tests to determine the most efficient, economical refractory for its forge furnaces.

Two identical furnaces were used—one lined with standard heavy duty firebrick, and the other with B&W Insulating Firebrick. Superior operating efficiency of B&W I.F.B. was proved by these outstanding results:

	STANDARD FIREBRICK	B&W INSULATING FIREBRICK
Furnace Output	70 pieces per hr.	100 pieces per hr.
Heating-Up Time	3½ hours	35 minutes
Cycle Time	50 minutes	30 minutes
Fuel Consumption During Heating-up		reduced 83%
Fuel Consumption During Operation		reduced 50%

As a result of these tests, River Valley Forge Company lined all of its furnaces with B&W Insulating Firebrick, thereby increasing the capacity of all forging units—reducing production costs—insuring more uniform forgings through better control.

This case history is typical of the advantages to be obtained from B&W Refractories in every type of industrial furnace. Your local B&W Refractories Engineer will gladly explain how a complete installation of B&W Refractories can increase over-all operating efficiency in *your* plant. Call on him at any time.

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R-233

OBITUARY

RALPH H. WEST, 69, founder of the West Steel Casting Co., Cleveland, died Aug. 21, at his home in Wickliffe, O. Mr. West, a native Clevelander, was graduated from Case School of Applied Science, and became associated with Mesta Machine Co., Pittsburgh, for a short time. In 1906 he founded the

RALPH H. WEST

company which bears his name, and was president and chairman of the board of directors until his death. He was a member and a former director of the Northeastern Ohio Chapter of the American Foundrymen's Association.

• • •

Stanley C. Mefford, 49, secretary-treasurer, Auburn Foundry Inc., Auburn, Ind., from 1932-45, died Aug. 16, at his home in Auburn, following a year's illness. Mr. Mefford was born in Augusta, Ky., his family moving to Ohio shortly thereafter. In 1920 he became associated with Hamilton Foundry & Machine Co., Hamilton, O., and joined Auburn Foundry in 1928, as production manager. He became secretary-treasurer of the company four years later. Mr. Mefford served as treasurer of the Gray Iron Founders' Society Inc. from 1940-44 and subsequently was elected a director.

• • •

Richard A. Wilson, 58, superintendent of the finishing department, National Malleable & Steel Castings Co., Cleveland, died Aug. 14 at his home in Cleveland Heights. Mr. Wilson, a native Clevelander, was graduated from Case School of Applied Science in 1913 and had been associated with National Malleable for 28 years.

• • •

John J. Stone, 59, since 1938 special products engineer, Bethlehem Steel Co., Bethlehem, Pa., died Aug. 31 at Brandon, Vt. A native of Sioux City, Iowa, Mr. Stone joined Bethlehem Steel Co. in 1911, following graduation from Stephens Institute of Technology. He was successively assistant foreman of treatment, superintendent, superintendent of forges and foundries and special products engineer of the armor plate department. During World Wars I and II he was closely identified with the developments of high grade armor plate, in collaboration with the U. S. Bureau of Ordnance, Navy Department. He has served in an advisory capacity for the last year.

• • •

Hugh A. Mackie, 77, pattern shop foreman and foundry superintendent, Homestake Mining Co., Lead, S. Dak., until he retired in 1939, died Aug. 21, at the Homestake Hospital. A native of Glasgow, Scotland, Mr. Mackie served six years' apprenticeship there as a patternmaker, coming to the United States in 1890. He joined Homestake Mining Co. in 1902 as a foreman patternmaker, and in 1923 was made supervisor of the foundry as well. That year he and his foundry foreman were awarded the Obermayer prize at the Cleveland AFA convention, for ingenious equipment and methods for casting 12-inch chilled mine car wheels.

• • •

Geral Thorp, 53, vice president of Bethlehem Foundry & Machine Co., Bethlehem, Pa., died Aug. 23 in that city. Mr. Thorp was graduated from Lehigh University in 1916 and served with the Chemical Warfare Service during World War I. After the war he was associated with Merck & Co. and with Dr. Herbert Threlkeld Edwards in the development of X-ray intensifying screens. He joined Bethlehem Foundry & Machine Co. in 1935.

• • •

Charles Cobb III, 51, executive vice president of the Marshall Car Wheel & Foundry Co., Marshall, Tex., died Aug. 2 at Freeport, Tex.

• • •

Morrell J. Stark, 54, purchasing agent for the Superior Foundry Co., Cleveland, died Aug. 18 in Ashtabula, O.,

• • •

Stephen J. Babusek, 57, owner of the Star Aluminum & Brass Foundry, Chicago, died Sept. 1 in that city.

• • •

Milton Rowley, president, Keystone Brass Works, Erie, Pa., died Aug. 10.

• • •

Herman Alex, associated with the foundry and pattern shop, Rock Island Arsenal, Rock Island, Ill., for over 50 years, died recently. Mr. Alex was born in Davenport, Iowa, and served a foundry apprenticeship from 1889-1892 with the Davenport Foundry & Machine Co., Davenport. He joined the Rock Island Arsenal in 1892, as a molder and was made general foreman in 1911. He was an active member of Quad City Chapter of the AFA and served as its chairman in 1939. In 1944 Mr. Alex was elected an honorary member of the AFA.

• • •

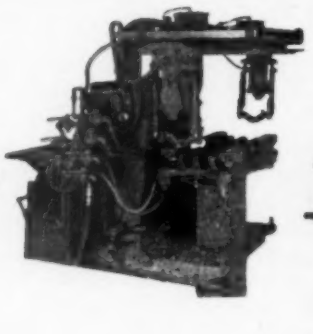
Charles H. McCrea, 56, president, National Malleable & Steel Castings Co., Cleveland, died Aug. 24 in that city, following a stroke which he suffered the previous day. Mr. McCrea was born in

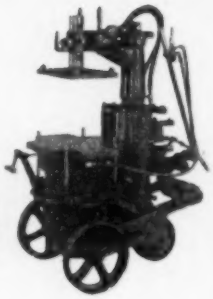
CHARLES H. McCREA

Logansport, Ind., and was graduated from Purdue University in 1912. In 1914 he joined National Malleable as a special engineer, working out of Cleveland, Sharon, Pa., and Chicago offices. He was made district manager of the St. Louis territory in 1920. Subsequently he did foreign sales work for the company, and in 1931 he became sales manager of the Cleveland works, manager of the plant in 1938, and vice president and a director of the organization in 1942. In the latter part of that year he succeeded Carl C. Gibbs as president. Mr. McCrea was a former director of the Malleable Founders' Society.

Issues Management Bulletins

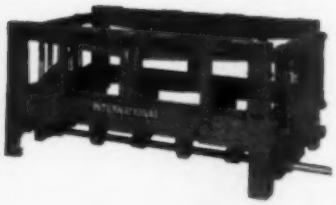
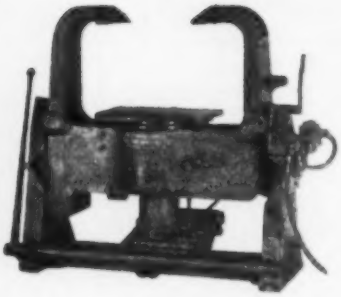
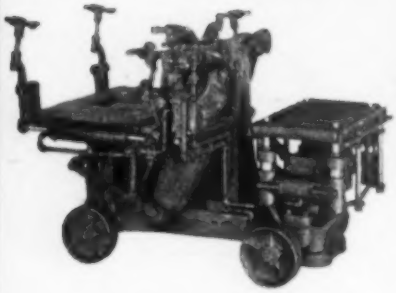
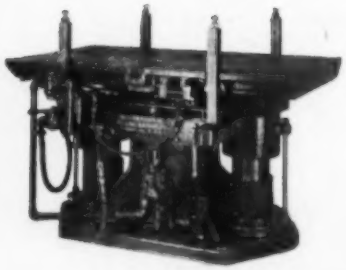
American Management Association, 330 West 42nd St., New York 18, has available informative bulletins in the Personnel Series, numbered from 87 to 96, with the following titles and prices: "The Foreman in Labor Relations," "Developing a National Labor Policy," "Individualized Executive Selection," "Training and Follow-Up," "Should Management Be Unionized?"—all priced at 50 cents; "Practical Approaches to Labor Relations Problems," at $1.00; "Seniority in Veteran Re-Employment," "Advances in Personnel Administration," at 75 cents; "Meeting Personnel Requirements of Reconversion," $1.00; "Trends in Union Demands," and "Planning Supervisory Development," 50 cents.





INTERNATIONAL MOLDING MACHINES

For Castings

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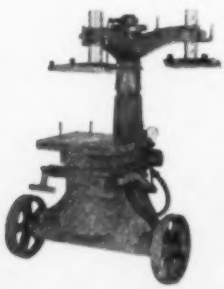
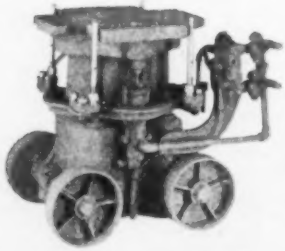
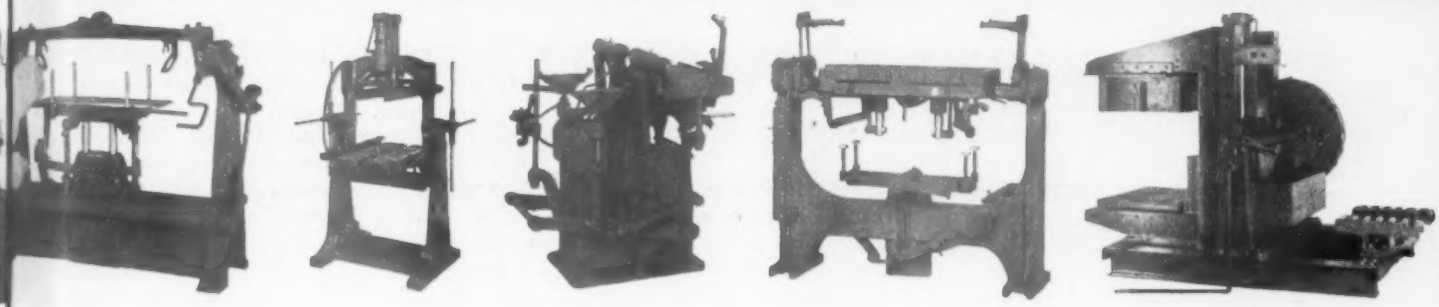
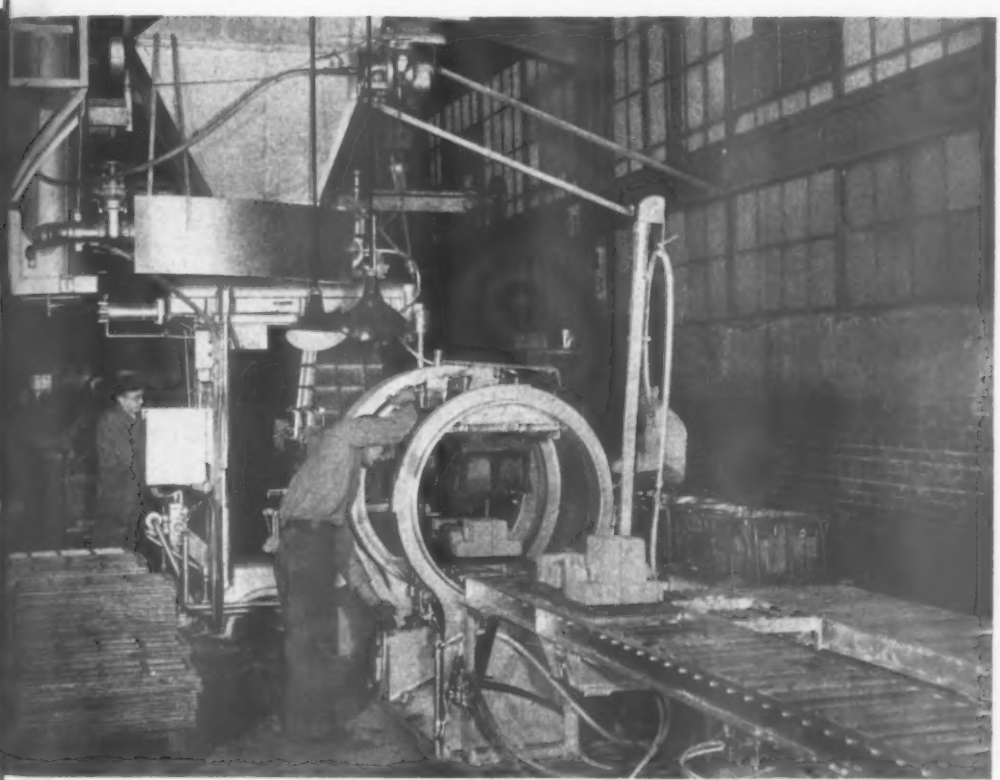
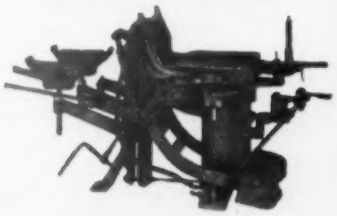



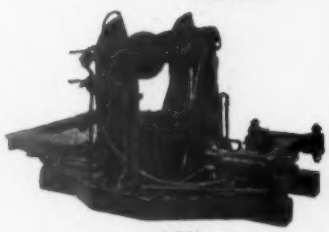


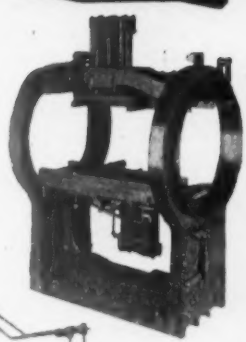
INTERNATIONAL MOLDING MACHINES

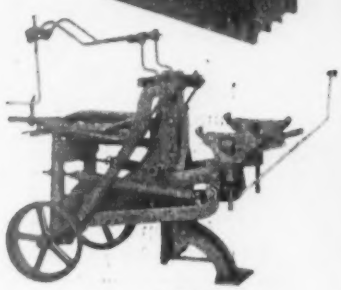
For Cores











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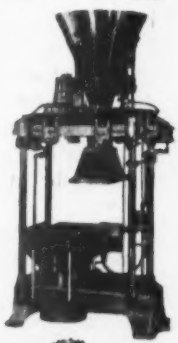

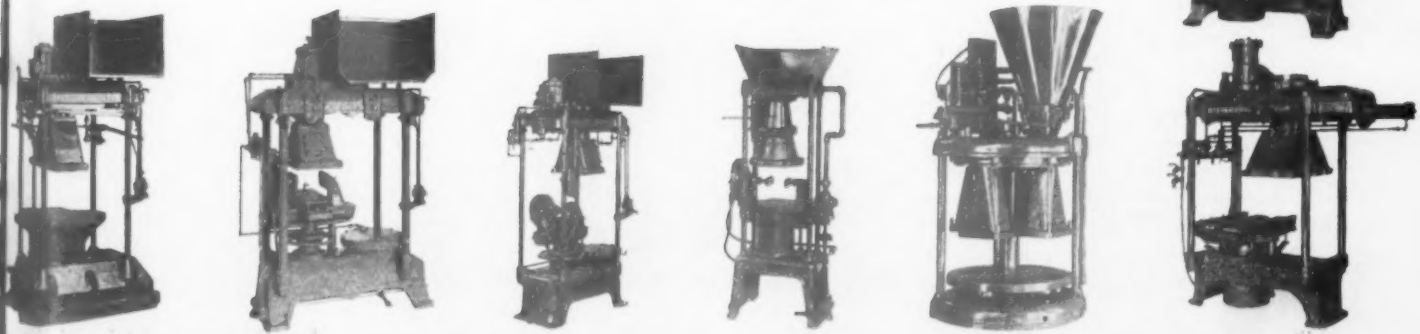

RECOMMENDS CHANGES

In Pattern Color Standards

By FRANK C. CECH
Chairman
Patternmaking Division, AFA

THE Patternmaking Division of the American Foundrymen's Association has a standing committee on Pattern Color Standards Revision. Although its personnel has changed somewhat from time to time, a representative committee, after widespread discussion and consideration of letters received, is recommending the adoption of the following pattern color standards to replace those now existing but little used:

1. Unfinished surfaces of body of pattern to be painted clear (or clear orange as in the use of shellac). The customer is thus able to see the pattern construction which must so often be pointed out by the jobber in discussing stability, foundry use and price. When the pattern has been in use for some time and, because of wear, needs refinishing, chrome yellow is set as a standard to offset further wear and make possible sharp color contrast.

2. Machined surfaces are to be painted red.

3. Coreprints and sections of pattern where a core cuts through are to be painted black. (This is provincially referred to as a core kissing through or touch core).

4. Seats of, and for, loose pieces and loose coreprints are to be painted aluminum. Aluminum has good wearing qualities, color contrast and saves striping time, as well as being neater in appearance.

5. Stop-offs and tie bars that are used to give the pattern rigidity, and consequently stopped-off in the mold, are to be green.

6. Partings of split patterns are to be painted clear (or clear orange) with the cored sections on the drag half painted black. Interlocking cores are to be dotted-in or finely lined. This is a distinct help to the molder on short-runs or reorders.

7. Core boxes are to be colored in the same manner as patterns, that is, clear (or clear orange). The face or wearing surface is also to be clear (or clear orange). Core print areas are to be painted black to correspond to core prints on the pattern and loose piece seats as well as loose piece contact surfaces to be in aluminum. Machined surfaces to be red. To preserve the coreboxes it is also recommended that the sides and bottoms of coreboxes be painted black.

Following are some other suggestions made on color standards:

1. Standardize color for chills or chilled areas or chilled prints. This is opened for more discussion before a definite recommendation is submitted for adoption.

2. Standardize colors for change-over pieces. This has been left out of the standards as it is best to word on the patterns and core boxes such notes as will eliminate possibilities of errors. Such notes are either painted or stamped on.

3. Standardize colors for tie bars. This is included in the recommended standards.

4. Standardize colors for different metals. The committee took no action on this as it has been handled by individual companies to suit their own specifications.

5. Standardize colors for metal thicknesses. The recommendations include this phase of standardization when possible to show on the pattern parting. If on the top of patterns, it is recommended that it be dotted in or finely lined in a contrasting color.

Further discussion of these standards may be forwarded to the committee in care of the American Foundrymen's Association or this publication.

New Foundry Formed In Specialty Field

As the inital step in development of production facilities for a variety of specialty alloy castings, principally for the automotive trade, Engineering Castings Inc., 600 South Kalamazoo street, Marshall, Mich., has been organized by two former associates in the Detroit Electric Furnace Division, Kuhlman Electric Co., Bay City, Mich. Albert E. Rhoads and David W. Boyd—with Fred J. Walls, International Nickel Co. Inc., Detroit, serving as a third director.

ALBERT E. RHOADS

Mr. Rhoads has been active with Detroit Electric Furnace since its inception in 1918, serving as vice president in charge of sales and service until 1938 when the company became a part of Kuhlman Electric. For five years he was manager of the Detroit Electric Furnace Division and then was named executive vice president and general manager of Kuhlman, a post from which he now resigned. He is president of the new organization.

Mr. Boyd has been manager of sales and service of the furnace division since 1939, and will be works manager and secretary-treasurer of the new company.

Kenneth Loer, service engineer for Detroit Electric Furnace, has joined Engineering Castings as superintendent.

Initial operations at Marshall have been started on an order for 100,000 high-alloy iron automotive engine parts. Two 200-lb capacity indirect arc rocking furnaces have been installed for melting. Molds will travel on a small conveyor loop and all manual effort will be reduced to a minimum. The backers expect that eventually operations will be expanded into a number of new fields from the limited beginning.

Corrosion Research Project Started

Ohio State University's corrosion research laboratory is conducting, under the direction of Prof. M. G. Fontana, a corrosion project sponsored by the Navy Department's Office of Research and Invention. The work is aimed at fundamental researches in metal corrosion, the reasons for corrosion, and ways to combat it. The Navy has imposed no restrictions on details of research methods or publication of the results of Ohio State's work and it is expected that the results of the project will be of benefit to both the Navy and the nation in general.

Enlarges Facilities For Sand Testing

Earl E. Woodliff, for a number of years operating his own foundry sand testing service at 14611 Fenkell, Detroit 27, has enlarged facilities for testing and research work on sands and binders by purchasing testing instruments from the Steel Founders' Society of America which were used in this group's work on report No. 7, "Comparison of Properties of Core Oils and Binders and Development of Acceptance Tests." This report was based on work carried out in Woodliff's laboratory, opened in 1944.

"THAT KIND OF WORK BELONGS TO CONVEYORS"

Cooling lines of Logan Roller Conveyor receive molds from power-driven transfer car which has picked up the poured molds from Logan pouring lines of Roller Conveyor. Transfer car is equipped with bed of Logan Rolls, and chain and dog mechanism "pushes" molds off the car to various cooling lines.

MANUAL handling in the foundry, as in all industry, means waste motion and often costly "waiting time." Also, push-lug-and-carry jobs sap human energy and time which can be better applied to *productive* tasks. . . Tireless Logan Conveyors move molds, flasks and castings to and from foundry operations and do it more systematically and efficiently. . . . Call in the nearest Logan field engineer today or write for literature.

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PUT *FLOW* INTO PRODUCTION

AN INCENTIVE SYSTEM

For Repair Welding Steel Castings

By WILLIAM S. HANSEN
Williams & Hansen
Industrial Management Engineers
Milwaukee

REPAIR welding of castings is one of the most difficult, if not the most difficult, of steel foundry operations to control as to quality and quantity of output. In addition, another problem is presented by the fact that welders in most foundries are in the high hourly wage bracket. Because of this, the cost of repair welding is a factor which requires careful study and correct approach to bring about an economical welding cost per ton of castings.

A reliable system for systematically controlling the quality and quantity of the welders' output can be an important factor in reducing repair welding cost. Such a system must benefit both the company and the welder—turning out high quality repair jobs on a low cost, mass basis for the company and acting as an incentive for the welder to produce large quantities with the desired quality.

Most foundries, realizing the difficulty of establishing an incentive for welders, decide to continue this operation on a day-work basis and depend on supervision—usually more than is available—to get as much production as possible. This is not conducive to a low cost. If the welders are driven too hard, production goes up and quality goes down, necessitating rewelding to correct the initial bad welding. If management decides to let the welders set their own standards, production usually goes down but quality does not necessarily go up.

Where volume of similar castings is high attempts have been made to establish rates by direct time study. Rates established by such methods have generally proved unsatisfactory to both management and welders. Individual piece rates established from the average of innumerable time studies seldom work out well. They will be too tight or too loose because of the inherent wide range of welding on the same castings. Furthermore, it is almost impossible to establish accurate rates for all castings. For those which carry rates, it is difficult to check whether the actual amount of welding done (arc time) is equal to the amount called for to do the job properly. There is little control over the welding heat used, or the size of the weld after the rate has been established, or the size and type of electrode used. Possibilities for establishing an inaccurate rate are great, and present labor conditions make it almost impossible to reduce a rate once it has been established.

Another incentive plan is a form of group bonus based on the weight of the total castings welded per shift. Most such plans are based on past performance figures, and it is difficult to determine what level of effort those figures represent.

Unsatisfactory payment plans are poor business. Eventually they break down, leading to inevitable dissatisfaction and innumerable grievances. An incentive payment plan to yield the desired results should possess most of the following characteristics:

1. It should be fair to both the employee and the employer. The reward for extra effort on the part of an operator should be positive and obvious to the operator. It must stimulate confidence.

2. It should require high output, but the reward must also be in proportion to output. It should yield 1 per cent increase in earnings for each 1 per cent increase in production over standard.

3. It must be basically sound in its conception to guarantee against the necessity of cutting rates. The practice of cutting rates definitely does not lead to good labor relations.

4. It should be reasonably simple for the operator to figure or understand. Results of increased effort should be available to the operator quickly.

5. It should yield information which management can adapt and use with other controls.

6. It should automatically assist supervision in a practical way by requiring less direct supervision.

Plan Based on Three Variables

One method which meets the requirements of a sound incentive plan, is practical, and in foundries where it has been installed has increased production 40 per cent, plus an increase in quality, is based on three variables:

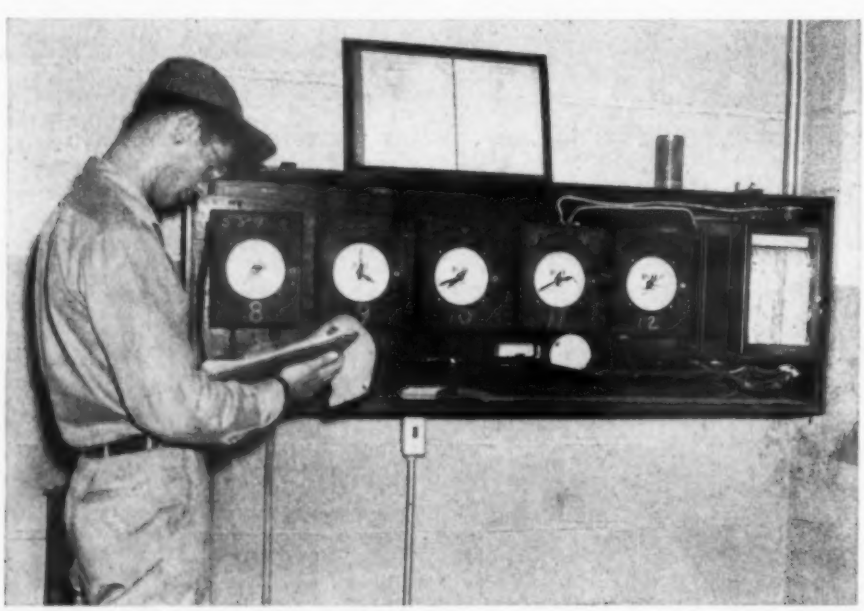
1. Arc minutes—the actual arc time required per working period to weld a given amount of castings.

2. Number of castings welded. This must be included to compensate for handling and variations in conditions of castings.

3. Weight of castings. Logically weight must also be an integral part of the incentive because differences in weights of castings also have a bearing on handling.

Arc time can be measured and recorded accurately by an electrical arc timer such as shown in the accompanying illustration. These timers are manufactured by the Harnischfeger Corp., Milwaukee. Number and weight of castings welded are relatively easy to ascertain, but all three factors must be correlated and the analyst must exercise extreme care to obtain the required accuracy. The information is set up in tabular form from which welders' earnings are computed daily, and this form may be posted in a convenient place near the welding booths so the welders can compute their earnings at the end of each working period if they wish. The form is shown in the il-

(*Concluded on page* 152)



Centralized system for measuring arc time consumed by individual welders. Recorder at right makes permanent record of readings for each timer. Chart at top enables operators to compute their earnings readily

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Pace Setters

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The No. 612 Portable Jolt Roll-Over is designed specially for work requiring absolute accuracy in ramming and drawing. It is ideally used for making the intricate cores and molds required in aircraft and other precision industries. Use of two roll-over cylinders and oil dash pot control assures smooth uniform operation. "J & J" has just the machine you need. Tell us about your job, and let us help you make a selection.

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JOLT, SQUEEZE, STRIPPING PLATE AND PATTERN DRAWS
Popular for medium service —2 sizes

PORTABLE JOLT ROLL-OVER AND PATTERN DRAW
A heavy duty thoroughly dependable machine—portable

JOLT ROLL-OVER AND PATTERN DRAWS
Fast large capacity machines with roll-out conveyors—4 sizes

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867 Addison Road • Cleveland 14, Ohio

IMPROVED UP-TO-THE-MINUTE MOLDING MACHINES FOR EVERY NEED

(*Concluded from page* 150)

lustration at the top of the battery of timers.

The electric arc timer method records accurately the time actually spent on welding. The weight and count factors compensate for handling, etc. Use of the correct heat and rod are insured, resulting in quality welding and good production, and the welder is compensated for variations in amount of welding caused by casting conditions. Minimum supervision is required, but the system provides complete incentive coverage on all types of castings.

Two arc time recording systems are available—the single unit and the centralized system. The former is used in smaller operations where the complete system is not necessary or justified. The centralized system consists of electrical timers, relays and a graphic recorder. Each timer, in addition to providing a visual record of actual arc time, is connected in parallel with the recorder to simultaneously provide a permanent record of arc time. Each recorder will handle up to 20 timers or 20 welding machines. In both cases the arc timer registers when—and only when—the machine is welding; it will not register when the machine is idling or when there is a short circuit condition.

It is not necessary to use the recorder in conjunction with the timers; each timer may be read at the beginning and end of a work period and the arc time tabulated, as is done in the case of the single unit timer. However, the recorder simplifies the taking of readings and provides a permanent record which can be filed for future reference. The recorder shown in the illustration at the right of the timers also is hooked up in this particular installation with the shot-blast department where operations likewise are established on the principle of the arc welding incentive.

Book Review

The Heating of Steel, edited by M. H. Mawhinney, 265 pages, published by Reinhold Publishing Corp., New York. Price $4.75.

The author of this book undertakes to present a practical discussion of those features of heating methods and of furnace tools which are important in obtaining the best results from the heating of steel. A careful review of the progress of the last 20 years in the heat-treating of steel which is performed in modern equipment incorporating indirect heating, gas protection, refractory insulation linings, alloy conveyors and many other improvements, is made in the book. Chemical effects of heating steel, fuels and burner equipment, temperature distribution and furnace control, heat transfer and fuel economy, quenching of steel, alloys and refractories, and steel mill furnaces, are among the subjects covered.

Foundry Statistics

(Reported by Bureau of the Census)

Copper-base Alloy Castings

(Thousands of pounds)

	Shipments			Unfilled *Orders
	Total	Sand	Perm. Mold	
1946				
Jan.	70,012	65,107	1,886	71,827
Feb.	61,698	56,992	1,713	72,736
Mar.	71,370	66,076	2,353	70,622
Apr.	76,366	71,105	2,390	71,103
May	76,122	70,748	2,453	76,792

* For sale only.

Gray Iron Castings

(Net ton)

	Shipments		Unfilled *Orders
	Total	For sale	
1945			
Jan.	861,524	536,499	1,921,572
Feb.	816,467	511,184	1,998,270
Mar.	927,925	587,380	2,089,046
Apr.	842,979	532,015	2,031,668
May	866,951	542,337	2,031,318
June	849,449	543,788	2,015,625
July	748,790	468,017	2,015,005
Aug.	750,050	462,364	1,817,801
Sept.	717,768	434,416	1,754,515
Oct.	767,209	461,720	1,741,981
Nov.	751,092	445,952	1,847,468
Dec.	678,091	397,529	1,877,095
1946			
Jan.	706,319	446,567	2,076,994
Feb.	541,177	368,384	2,152,766
Mar.	796,068	505,431	2,265,336
Apr.	856,678	529,323	2,378,348
May	757,041	454,194	2,491,811
June	738,060	435,868	2,633,118
July	810,829	475,059	2,668,782

* For sale only

Aluminum Castings

(Thousands of pounds)

	Shipments			Unfilled *Orders
	Total	Sand	Perm. Mold	
1945				
Jan.	45,588	27,168	10,692	....
Feb.	44,091	26,674	9,844	....
Mar.	50,275	29,478	12,355	....
Apr.	46,320	27,090	11,185	....
May	43,323	24,398	10,977	....
June	39,074	21,050	10,254	....
July	31,130	15,573	8,859	....
Aug.	22,845	11,384	6,568	....
Sept.	15,805	7,313	5,325	....
Oct.	19,825	8,410	7,647	....
Nov.	18,961	8,137	7,305	....
Dec.	17,770	7,222	7,248	....
1946				
Jan.	23,568	9,556	10,131	83,541
Feb.	23,231	11,613	7,866	94,858
Mar.	26,661	10,792	11,305	97,013
Apr.	27,692	11,562	11,010	100,267
May	29,172	11,627	12,220	117,710

* For sale only.

Malleable Iron Castings

(Net tons)

	Shipments		Unfilled *Orders
	Total	For Sale	
1945			
Jan.	78,788	54,111	345,112
Feb.	75,220	51,089	341,558
Mar.	85,307	58,711	349,935
Apr.	76,065	51,011	346,421
May	79,565	52,789	328,471
June	71,992	47,510	285,210
July	55,813	35,439	284,017
Aug.	52,647	33,239	232,136
Sept.	46,960	28,506	219,905
Oct.	59,096	37,307	229,618
Nov.	57,315	36,007	227,309
Dec.	51,963	35,168	236,648
1946			
Jan.	53,685	36,181	245,878
Feb.	40,156	29,338	247,644
Mar.	50,235	33,978	263,227
Apr.	65,010	36,298	275,053
May	62,598	34,975	279,065
June	61,650	35,468	275,845
July	64,446	38,021	271,981

* For sale only.

Magnesium Castings

(Thousands of pounds)

	Shipments			Unfilled Orders†
	Total	Sand	Perm. Mold*	
1945				
Jan.	10,424	6,149	4,028	....
Feb.	10,366	5,832	4,317	....
Mar.	12,646	6,703	5,677	....
Apr.	11,903	6,257	5,464	....
May	12,134	6,081	5,865	....
June	10,566	4,878	5,473	....
July	9,838	3,961	5,677	....
Aug.	4,960	1,820	3,036	....
Sept.	169	137	13	....
Oct.	251	216	13	....
Nov.	236	208	15	....
Dec.	261	230	14	....
1946				
Jan.	898	349	16	3,114
Feb.	438	366	35	3,338
Mar.	594	525	33	3,484
Apr.	570	465	36	3,297
May	661	587	45	3,778

* Includes incendiary bomb castings.
† For sale only.

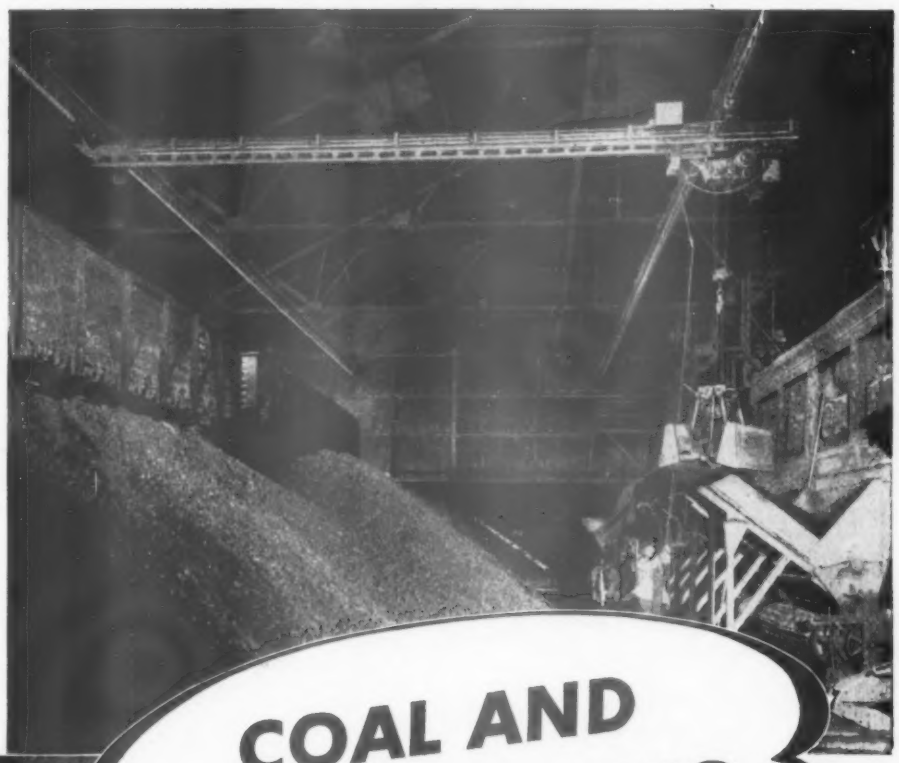
Steel Castings

(Net tons)

	Shipments		Unfilled Orders
	Total	For Sale	
1945			
Jan.	210,212	165,116	983,137
Feb.	191,361	152,082	1,045,374
Mar.	222,591	173,506	1,047,660
Apr.	197,737	154,883	1,018,990
May	192,921	149,623	852,877
June	173,685	129,193	776,265
July	139,315	102,428	728,397
Aug.	131,411	98,080	565,539
Sept.	114,613	83,751	513,758
Oct.	130,344	99,495	460,332
Nov.	123,048	91,409	443,778
Dec.	115,239	85,391	434,287
1946			
Jan.	99,058	77,071	*358,926
Feb.	57,423	45,151	390,077
Mar.	101,398	80,843	412,325
Apr.	146,327	108,586	392,790
May	129,211	94,630	381,654
June	123,551	91,715	361,293
July	119,157	84,422	362,581

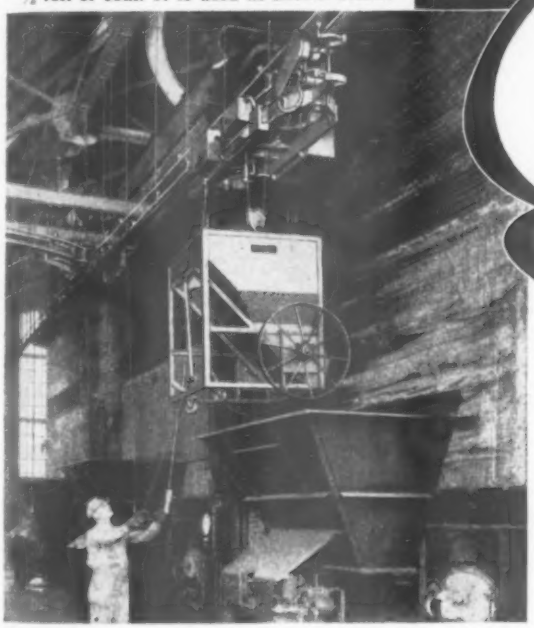
*For sale only. Unfilled orders for 1945 include tonnage for sale and own use.

80 to 100 tons of coal are fed every 24 hours to the stoker hoppers of two 340 h.p. and two 560 h.p. boilers in this plant with a motor-driven floor-controlled Cleveland Tramrail crane and one-half yard single line grab bucket.



This bucket is ¾ yard size and carries ½ ton of coal. It is used as shown below.

COAL AND ASH HANDLING MADE EASY



Buckets are rolled under discharge chutes of overhead bin or to outside coal storage and filled. They then are picked up and delivered to stoker hoppers by Tramrail System. Same equipment hauls ashes away.

In many boiler rooms the problem of handling coal and ashes has been simplified by means of a Cleveland Tramrail overhead system. This equipment not only eases the work but cuts costs.

Both overhead cranes and rail systems are used depending upon the application. For large boiler rooms, as illustrated above, grab bucket handling cranes have proven advantageous. Overhead rail equipment as shown at left with electric hoist is in use in many small and medium size plants. One man usually can take care of a boiler room with this equipment and keep it clean and orderly. Inexpensive manually-operated equipment for handling one-half to one ton coal per hour can also be furnished.

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CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

Mark Anniversaries

Canadian Bronze Co. Ltd., Montreal, Que., celebrated its 50th anniversary, Aug. 6, with a luncheon attended by 250 guests at the Normandie Roof, Mount Royal Hotel, Montreal. It was also the 50th birthday of W. L. Bayer, president and chairman of the board of directors of the company. Earlier in the day Mr. Bayer was presented with a bronze bust of himself by supervisory officers and members of the firm's Quarter Century Club. The picture shows the head table at the luncheon with Mr. Bayer in the insert. Present at the luncheon were guests and representatives of the firm from New York, St. Thomas, Toronto, Winnipeg, Calgary, St. Louis, Chicago and other points.

REGIONAL CONFERENCE

To Be Held in Philadelphia, Nov. 1-2

METROPOLITAN, Chesapeake and Philadelphia Chapters of the American Foundrymen's Association will hold their regional conference Nov. 1 and 2, at Town Hall, Broad and Race Sts., Philadelphia. Registration will start Friday at 8:30 a.m., with a general meeting formally opening the conference at 10 a.m. Principal speaker at this general session will be Frank G. Steinebach, editor of THE FOUNDRY, who will talk on "Recent Development in the Foundry Industry."

Group meetings are scheduled for Friday afternoon and Saturday morning and will include simultaneous sessions of the steel group, gray and malleable iron groups and brass, bronze and light metal groups. A banquet and floor show will be held Saturday at 7 p.m.

B. A. Miller, superintendent of foundry works, Baldwin Locomotive Co. and chairman of the Philadelphia Chapter, is general chairman of the conference and has announced that there are unlimited housing facilities for those attending the conference.

The technical program is as follows:

GRAY AND MALLEABLE IRON

Friday, Nov. 1:

1 p.m.—"Should Your Foundry be Fully Mechanized," W. G. Reichert, president, W. G. Reichert Engineering Co., Newark, N. J. Chairman, R. L. Slater, vice president, Southern Wheel Division, American Brake Shoe Co., New York.

2:30 p.m.—"Pattern & Casting Design," James H. Lansing, consulting engineer Malleable Founders' Society, Cleveland. Chairman, H. L. Ullrich, superintendent, Sacks-Barlow Foundries, Newark, N. J.

4 p.m.—"Modern Foundry Refractories," C. E. Bales, vice pres., Ironton Fire Brick Co., Ironton, O. Chairman, W. W. Levi, metallurgist, Lynchburg Foundry Co., Lynchburg, Va.

Saturday, Nov. 2:

8:30 a.m.—"Molding Materials" Charles B. Schureman, technical consultant, F. E. Schundler & Co., Joliet, Ill. Chairman, R. J. Allen, metallurgical engineer, Worthington Pump & Machinery Corp., Harrison, N. J.

9:30 a.m.—"Gates & Risers for Sound Castings," Henry C. Winte, works metallurgist, Worthington Pump & Machinery Corp., Buffalo Chairman, George Hadzima, superintendent, Robbins Conveyors Inc., Passaic, N. J.

10:30 a.m.—"Casting Defects—Their Causes and Corrections," W. B. McFerrin, metallurgist, Electro Metallurgical Co., Detroit. Chairman, T. E. Eagan, chief metallurgist Cooper-Bessemer Corp., Grove City, Pa.

STEEL

Friday, Nov. 1:

1 p.m.—Opening of meeting. Chairman, John Howe Hall, foundry consultant, Swarthmore, Pa. Co-chairman, W. W. Swayze, general manager, Deemer Steel Castings Co., New Castle, Del.

1:15 p.m.—"Steel Castings for Naval Use," H. E. Cragin Jr., plant superintendent, Taylor Wharton Iron & Steel Co., Highbridge, N. J.

2:30 p.m.—"Sand Compounding for Large Castings," Douglas Taylor, ceramic engineer, Bethlehem Steel Co., Bethlehem, Pa.

3:45 p.m.—"Progress in Precision Casting," Phillip De Huff, metallurgist, Westinghouse Electric Corp., Lester, Pa.

Saturday, Nov. 2:

8:30 a.m.—Opening of meeting. Chairman, A. L. Wentzel, assistant to vice president, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa. Co-chairman, James A. Gillis, assistant superintendent of foundry, Bethlehem Steel Co., Steelton, Pa.

8:45 a.m.—"Why Doesn't the Blind Riser Function on High Alloy?" Carl Wheeler Jr., assistant superintendent, American Steel Castings Co., Newark, N. J.

10 a.m.—"Problems in the Production of Turbine Castings," I. A. Wettergreen, superintendent of foundry, General Electric Corp., Schenectady, N. Y.

11:15 a.m.—"Stack Molding Using the Washburn Principle," John A. Williams, foundry foreman, Dodge Steel Co., Philadelphia.

BRASS, BRONZE AND LIGHT METALS

Friday, Nov. 1:

1 p.m.—"Synthetic Sands for the Nonferrous Foundry," Stanley W. Brinson, U. S. Naval Shipyard, Norfolk, Va. Chairman, Clyde L. Frear, Bureau of Ships, Washington.

2:30 p.m.—"Pressure Tightness of Bronze Castings," Dr. Blake M. Loring, Naval Research Laboratory, Washington. Chairman, David Tamor, American Chain & Cable Co., York, Pa.

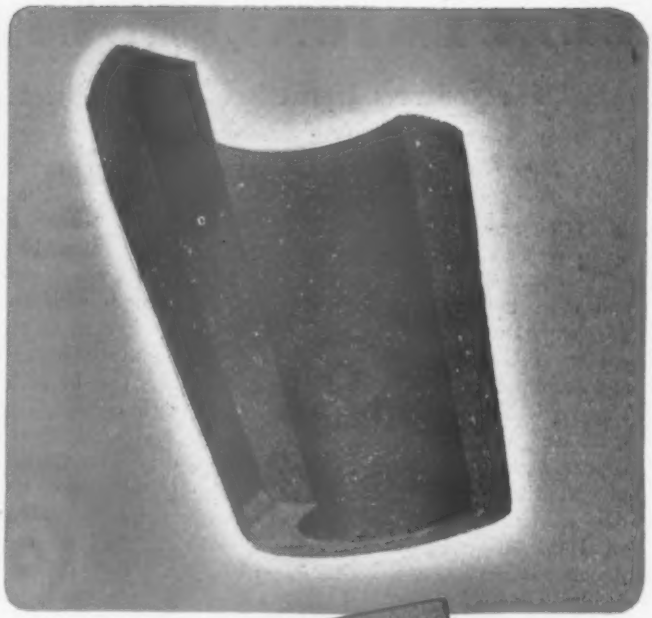
4 p.m.—"Comparison of Foundry Characteristics of Various Aluminum Alloys" R. E. Ward, Eclipse Pioneer Division, Bendix Aviation Corp., Teterboro, N. J. Chairman, Earl J. Bush, U. S. Naval Gun Factory, Washington

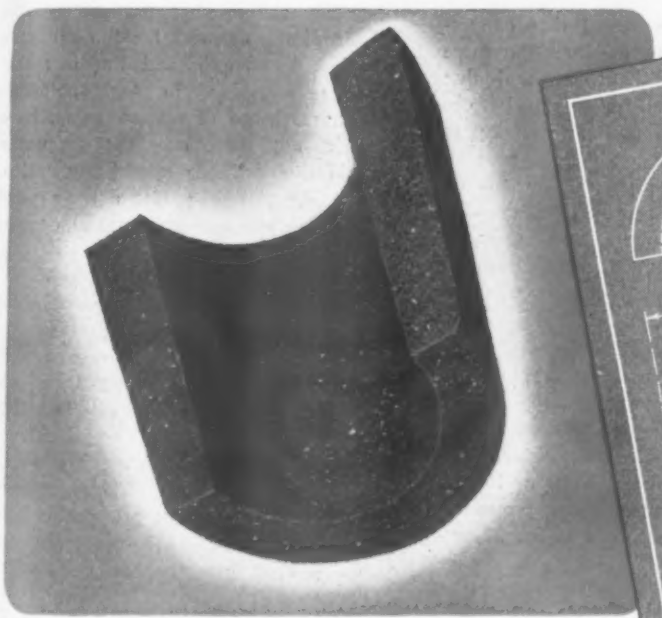
Saturday, Nov. 2:

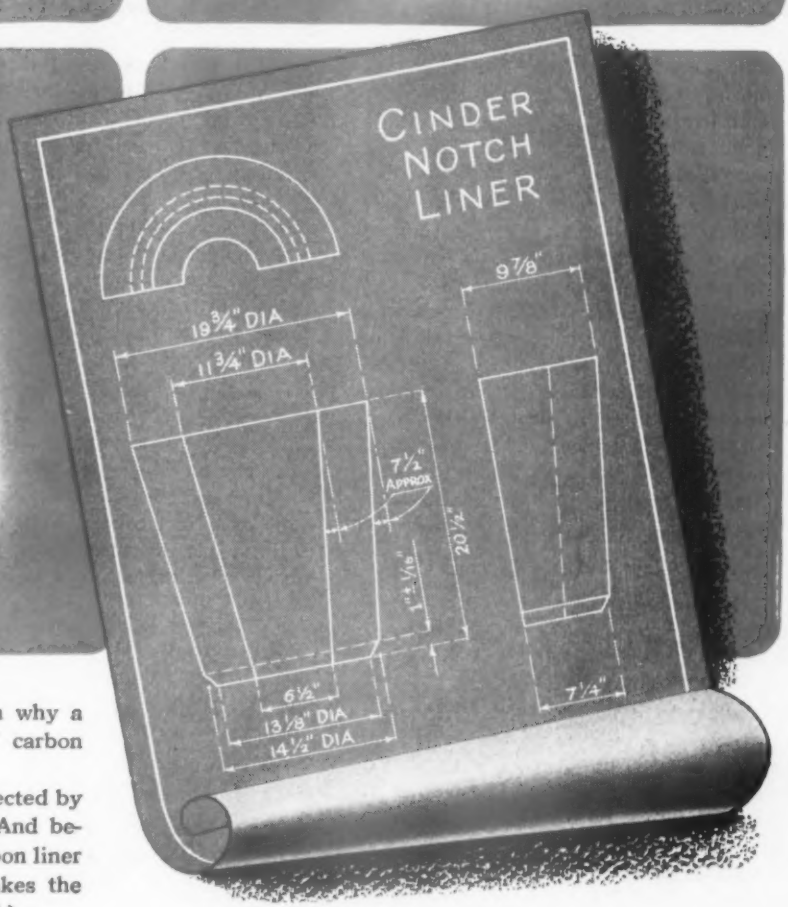
8:30 a.m.—"Melting and Furnace Problems in Brass & Bronze Foundries," H. L. Smith, Federated Metals Division, American Smelting & Refining Co., Pittsburgh. Chairman, J. E. Crown, U. S. Naval Gun Factory, Washington.

10:30 a.m.—"Melting Problems of Special Nonferrous Alloys," W. W. Edens, Ampco Metal Co., Milwaukee. Chairman, C. A. Robeck, Gibson & Kirk Co., Baltimore.

How Long will a CARBON CINDER NOTCH LINER Last?







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Easy to install—fewer joints.

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ELECTRICAL EQUIPMENT

Requires Special Analysis Castings

By R. A. COLLACOTT

Castings used in the construction of electrical equipment are often required to carry heavy currents, and must therefore posses a high degree of electrical conductivity. Mechanical strength is also essential, however, and the object of the designer is to find a metal which combines these desirable qualities. Although soft, low-strength copper, high-conductivity brass, and even phosphor-bronze have been employed, the trend in recent years has been toward the development of alloys which provide ample strength without loss of conductivity. The result is that alloy castings are now available which combine a conductivity approximating that of the best copper castings, with a strength and hardness which may be made as great as those of steel. Most of these alloys are patented compositions.

These new alloys are obtained by adding small amounts of either chromium, nickel, silicon, colbalt or beryllium to copper and then applying a special precipitation-hardening heat treatment. This produces finely dispersed submicroscopic particles of certain intermetallic compounds in the alloys which increase the tensile strength, hardness, wear resistance, and other mechanical properties of the copper while only slightly reducing the electrical conductivity.

Alloys Increase Strength

Precipitation-hardened copper alloys can be made with various properties by carefully selecting the hardening elements. Some alloys have tensile strengths ranging from 22 to 45 tons per square inch, and electrical conductivities varying from 80 per cent down to 60 per cent of that of standard copper as shown in the accompanying table, for the chromium-nickel-copper group. These alloys have quite favorable elasticity moduli; and their other mechanical properties, particularly fatigue resistance, are comparable with those for commercial copper.

Most of these alloys are corrosion resistant owing to strong, natural-oxide films on their surface, the formation of the films being influenced by the presence of either nickel or chromium in combination with the copper. The corrosion resistance is greater with extruded sections than with cast materials having a chilled skin at the surface.

Small percentages of cobalt, cadmium or beryllium are sometimes added to enhance one property or another to meet particular requirements. A beryllium-copper alloy, containing up to about 2.5 per cent Be is used for castings which, after heat-treatment, combine a remarkably high degree of hardness and strength with an electrical conductivity lower than that of some alloys yet still relatively high. Cobalt and beryllium may also be added to reduce the volatility of copper alloys, causing them to burn less readily than untreated copper when exposed to the arcing produced by powerful electric currents. With this modification copper alloys of the range already discussed are useful for switchgear construction, although other alloys have now been specially developed for this purpose.

It has also been found that copper-alloy castings can be machined far more easily than ordinary copper and that a smoother surface finish can be obtained. Owing also to their ductility in the annealed state and their superior tensile strength, it is possible to use copper alloys for extensive deep drawing processes. Furthermore, the ordinary methods of joining metals by either brazing or bronze-welding may be successfully employed.

High Conductivity Castings—One alloy of this class with high electrical conductivity is a ternary alloy of the chromium-nickel-copper type. Its electrical properties are comparable with those of typical copper, brass or bronze castings, yet its mechanical properties are far superior, as shown in the following table:

	Commercial Copper	Brass	Cr-Ni-Cu
Maximum stress, tons/sq in.	12	16	22
Yield or proof stress (0.1% extension, tons/sq in.) ...	2	4	15
Limit of proportionality tons/sq in. .	1	2	12
Elongation %	50	40	25
Brinell hardness ..	40	45	110
Izod impact strength, ft-lb ..	40	40	65
Conductivity, % pure copper	90	25	85

Tests show that these properties of the ternary alloy are also retained at elevated temperature. Ordinary soldering and working operations may be carried out without impairing their properties.

Mechanically Strong Conductors—A treated nickel-silicon-copper alloy is used when great mechanical strength or resistance to wear is required together with an economical current carrying capacity. Castings of this alloy have a tensile strength of 32 tons per square inch, brinell hardness of 180, and a conductivity which is more than 40 per cent that of pure copper. Such properties are particularly useful for high temperature purposes in furnaces.

Other applications of this alloy include such parts as contact blocks and switchgear components. Even high-strength aluminum bronzes have inferior mechanical properties to this alloy. Furthermore, this alloy does not develop such high-resistance oxide films on the surface as the aluminum bronzes do. It may be used without fear of the contact resistances increasing, or of encountering soldering or brazing difficulties.

Current Carrying Castings—The valuable properties of precipitation hardened alloys have been applied to many different types of electrical equipment. These include fittings for arc and induction furnaces, resistance welding machines, overhead gears, terminal blocks and clamps—to give only a few examples—but it is in circuit-breaker constuction that they are proving particularly useful. Here the demand for the optimum mechanical strength, and the fact that they are assembled in steel enclosures with a minimum of wasted space, have brought out their excellent properties and developed their range of application.

Although the alloys are a trifle more costly than ordinary commercial copper, their improved properties enable the maximum economy to be made in the size of section. It is thus possible for the initial cost to be only slightly greater when using these alloys. The savings in electrical losses during operation are nevertheless very considerable so that the operating costs will be decidedly reduced by using such materials. From the view point of safety, components, made of special alloys are particularly suitable if high, short-circuit currents are to be carried, even momentarily, without distortion.

Publishes New Trade Handbook

Committee for Economic Development, 285 Madison Ave., New York 17, has published a new handbook dealing with international trade in the postwar period, designed to assist manufacturers, wholesalers, jobbers and retailers whose plans for expansion of their enterprises include export and import trade operations. The handbook sets forth practical steps to which a businessman, whether already engaged in international trade or planning to enter the international market for the first time, should give consideration.

In 1945 foundries of the United States purchased over 2 1/3 million tons of coke, valued at approximately $27 million, for use in cupola melting.

For Accuracy, High Finish and Great Precision, Use These Tested Sterling Wheels

●These Sterling Cylindrical Grinding Wheels produce unsurpassed accuracy and smoothness of the ground surfaces. They readily shape and reduce to required size hard materials that cannot be machined . . . and do it to limits of 0.0001-inch, and better!

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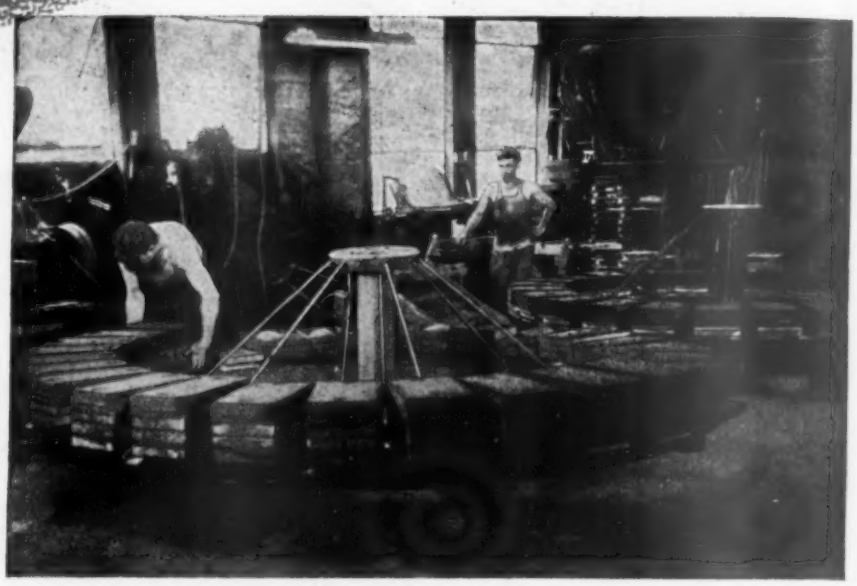
REVOLVING MOLD CONVEYORS

For All Foundries with Melting Facilities for Continuous Pour



Increases mold production . . . saves labor . . . reduces handling time . . . Speeds output . . . Comes ready for quick, easy installation . . . !

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3 Sizes

ROTO-CAST is made in three standard sizes: 10-ft., 12-ft., and 14-ft. diameters.

Full roller-bearing construction for easy turning. When desired, release of ratchet makes free-wheeling. Can be rotated with one finger even when fully loaded. No motors or other operating cost.

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* Designed by foundrymen under actual working conditions, ROTO-CAST conveyors are in use in representative foundries . . . have proven their unusual merit and efficiency.

Easy to assemble and install, the unit sets on the floor without the necessity of anchoring, thus giving full flexibility. It is placed just back of each molder who simply turns around, places his mold on the conveyor, then steps on a trip ratchet release . . . spring arrangement revolving ROTO-CAST to position for receiving the next mold.

Pouring may be done from one spot as the unit is revolved and stopped positively for the pour. Shake-out is at one spot with molds simply picked off and dumped as machine is revolved. Its low cost will surprise you.

WRITE FOR FOLDER "F" FOR FURTHER DETAILS

ROTO-CAST *Foundry Equipment, Inc.*

COLDWATER, MICHIGAN, U. S. A.

INDUSTRIAL EXPANSION

Is Active in South Africa

By B. P. SKOK
Koppel Engineering Ltd.
Johannesburg, South Africa

RECONVERSION of South African industry to peacetime levels has gathered momentum and many companies are embarking on large scale expansion programs. This is particularly true of iron and steel industries. During the war it was impossible to replace plant and equipment which became worn-out or obsolete. This situation has now changed and there is a concerted rush from all directions to replace existing plants with the most modern and efficient equipment available. Machine tool, foundry and steelworks suppliers are working at full speed to cope with the increasing demand.

The largest portion of equipment required for the reconversion and expansion programs is imported from Great Britain and the United States, although small supplies are beginning to trickle through from the liberated European countries. Any hopes which local industrialists had regarding resumption of full-scale production have been dampened by the news that deliveries of important machinery are behind 2 to 3 years for heavy equipment and from 6 to 12 months for light equipment. In addition, the shipping position is still acute and delays of several months before shipment takes place are quite common.

Install Mechanical Equipment

In this respect the foundry industry seems to be more fortunate than the general engineering industry, because molding machines and cleaning equipment are available in much less time than are various other types of equipment. Full advantage is being taken of this fact and every effort is being made to replace hand molding methods with mechanized equipment.

Leading the field in the expansion programs is the government-controlled South African Iron & Steel Industrial Corp. (Iscor). The corporation is going ahead with a £15,000,000 program, which includes doubling present steel production and provides for a complete new plant at the Van der Bijl Engineering Corp. (Vecor) site near Vereeniging. The new works will include a large and modern foundry capable of handling castings up to 120 tons. Although plans for this foundry are still largely embryonic, it has been revealed that several of the latest features in foundry practice are to be incorporated in the plant. The plant is about 35 miles from Johannesburg—center of the South African gold mining industry—near the highly industrialized town of Vereeniging. Also forming part of this works will be the newly formed Vecor with a capital of £2,000,000. Vecor will have the largest machine shop in southern Africa, and will be capable of handling work of a type never before attempted in the country.

Another development of interest to the foundry industry is the recent link-up between Scaw Alloys Inc. and the Carron Co., Falkirk, Scotland. The latter company is a prominent manufacturer of bathtubs and kindred items, and the link-up provides for the erection of a new foundry at Union Junction for the manufacture of these items in South Africa. Plans for this foundry are well advanced.

Increase Foundry Capacity

Recent foundry extensions have also been made by Messrs. James Barweel S. A. (Pty.) Ltd., Alberton. This company is associated with the British company of the same name which is known for the manufacture of taps and cocks. In addition to its tap production, the South African company will make ferrous castings. The new foundry already erected is completely mechanized and has a potential output of 40 tons of castings daily.

Durban Falkirk Iron Co. at Jacobs just outside of Durban, an associate of the British Falkirk Iron Co., is also expanding. The company is known for its stoves and cooking pots. The new foundry is to be erected at Newcastle close to the African Metals Corp. works. It will be entirely mechanized and will be designed primarily to produce stoves. A modern enameling plant will also be erected at the works. African Metal Corp. is also making extensions to its plant. An additional blast furnace was recently blown in there to increase the pig iron output. This company, an associate of Iscor, is responsible for a substantial portion of the country's output of pig iron.

South African Branch of the Institute of British Foundrymen held its annual meeting in Johannesburg, June 27, and elected Col. W. J. Grose, Messrs. Wright, Boag & Co., president for the coming year. Retiring president H. Holdsworth, foundry superintendent of the African Malleable Foundries Ltd., Benoni, praised the work of members during the war and stressed the need of close co-operation to carry out successfully the reconstruction and rehabilitation programs. The SABIBF is an active and progressive body with nearly 500 membership. Meetings are held monthly and papers dealing with foundry subjects are read.

Gray Iron Division Committee Named

Appointments to the 1946-47 analysis of castings' defects committee of the gray iron division of American Foundrymen's Association have been announced by T. E. Eagan, Cooper-Bessemer Corp., Grove City, Pa., division chairman. Members of the new committee include: W. A. Hambley, Slinger Foundry Co., Slinger, Wis., chairman; W. B. McFerrin, metallurgist, Electro Metallurgical Co., Detroit, co-chairman; George Anselman, service engineer, Goebig Mineral Supply Co., Chicago; T. E. Barlow, metallurgist, Battell Memorial Institute, Columbus, O.; A. S. Klopf, senior engineer, Lester B. Knight & Associates, Chicago; F. L. Overstreet, foundry engineer, Illinois Clay Products Co., Chicago, and Charles Zahn, foundry superintendent Vilter Mfg. Co., Milwaukee.

Offers Instruction For Trainees

Volume I of Instruction Programs covering sawing machines, precision sawing and filing methods has been published by the DoAll Co., 1301 Washington Ave. South, Minneapolis 4. The book, containing 272 pages, is a complete treatise on contour sawing and filing processes, and shows applications and operational techniques used in shaping all types of materials. Divided into sections covering both conventional and high-speed sawing procedures, it includes work projects and tests to be given trainees. Copies are available to companies for use in training programs as well as to vocational schools, upon request.

Bids Postponed on Cast Armor Plant

Opening of proposals for the surplus government-built cast armor plant at East Chicago, Ind., operated during the war by American Steel Foundries under lease, has been postponed by WAA from Sept. 24 to 3 p. m., Oct. 7. The foundry was built at a cost of $11,500,000 and contains machinery which cost another $14,500,000.

More Production...

THIS IS THE MACHINE:
Osborn Jolt Squeezer making cast iron bases

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America needs more production. Osborn Jolt Squeeze machines produce more for foundries—here you see just ½ day's output!

OSBORN

MOULDING MACHINES

MEMBER MANUFACTURER'S ASSOCIATION, INC. FOUNDRY EQUIPMENT

Activities of foundry GROUPS

Chicago

CHICAGO Chapter, AFA, chalked up another record on Aug. 24 for its annual stag outing and golf. The 1946 event held at the customary place, the swanky Lincolnshire Country Club near Crete, Ill., drew an all-time high attendance of approximately 1150, almost 50 more than last year. A beautiful sunny day with a top temperature of 73 provided ideal conditions for golf, the sports program, dinner and entertainment.

Golf was the main attraction for the energetic throughout the day. For those who take their recreation more moderately, there was a pari-mutuel horse racing game from 2 to 4 p.m. at a buck a ticket, with post time every 15 minutes, and the only attraction that cost money; horseshoe pitching contests; a horseshoe pitching exhibition by professionals with ringers piled high on the stakes; six good boxing bouts; and two top-grade wrestling matches.

Dinner was served at 7 p.m. under the Big Top—a new tent larger than previously available and providing adequate elbow room. After dinner, door prizes and sports prizes were handed out in generous number. Several acts of floor show wound up the evening.

The outing was arranged and directed by the chapter's entertainment committee headed by Ben A. Patch, district sales manager, Ohio Ferro-Alloys Corp., as chairman, and Harry E. Cullen, director of recreation, South Works, Carnegie-Illinois Steel Corp., as secretary.

Other members of the committee include: J. Behan, National Carbon Co.; Oscar Blohm, Hills-McCanna Co.; D. Canfield, Federal Foundry & Supply Co.; H. L. Charlson, American Steel Foundries; G. Cramer, American Manganese Steel Division, American Brake Shoe Co.; E. J. Cullinan, Western Foundry Co.; G. P. Fisher, Whiting Corp.; H. B. Fischer, Hill & Griffith Co.; F. B. Flynn, S. Obermayer Co.; H. A. Forsberg, Continental Foundry & Machine Co.; J. C. Gore, Werner G. Smith Co.; L. G. Gustafson, Continental Foundry & Machine Co.; E. E. Henry, Hammond Brass Works; R. M. Jones, South Works, Carnegie-Illinois Steel Corp.; C. C. Kawin, Charles C. Kawin Co.; G. E. Kennelley, General Refractories Co.; R. A. Lindgren, Wisconsin Steel Division, International Harvester Co.; A. V. Magnuson, Champion Foundry & Machine Co.; T. J. Magnuson, J. S. McCormick Co.; S. E. McGinty, Firegan Sales Co.

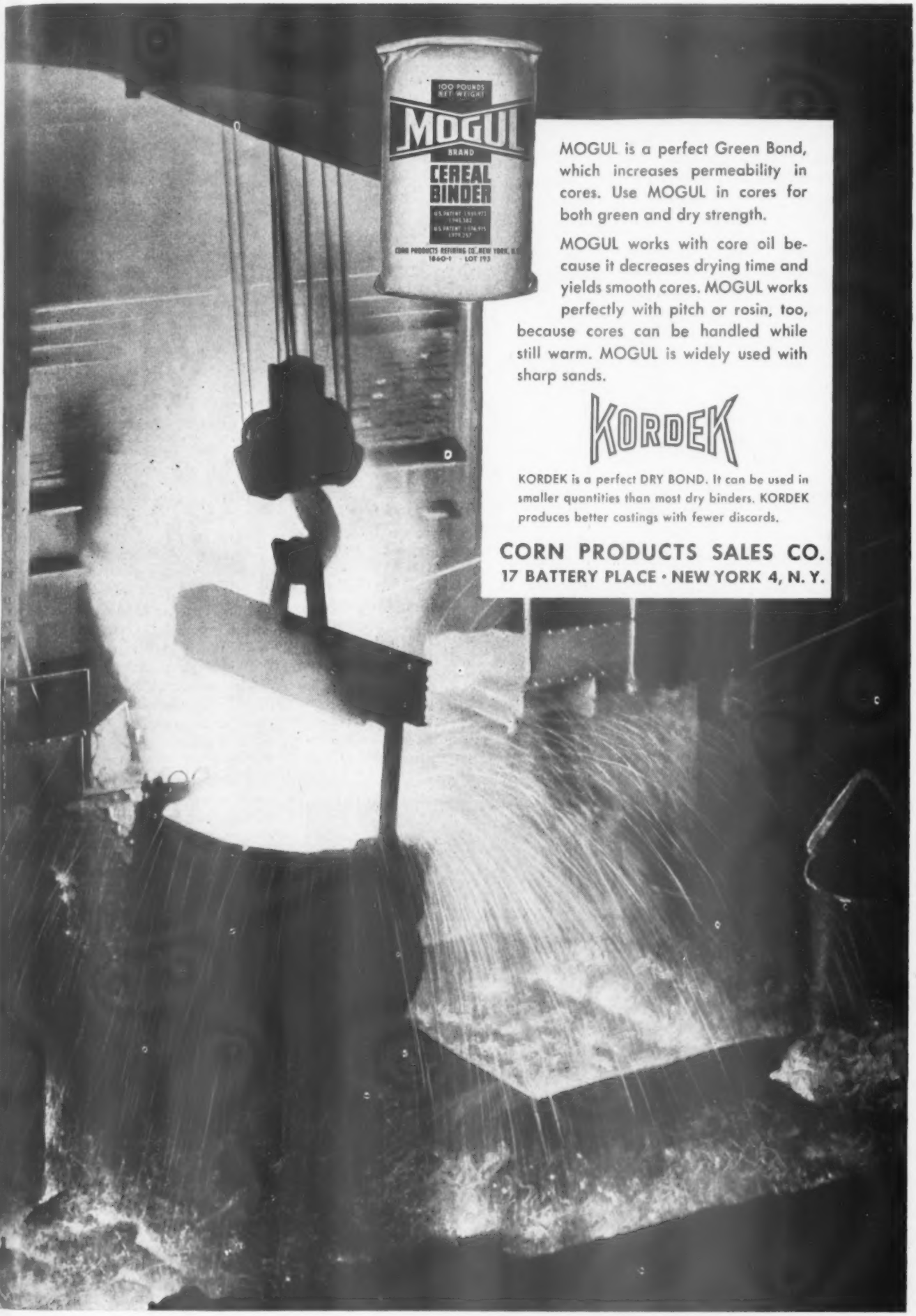
N. L. Mooneyham, Velsicol Corp.; W. W. Moore, Burnside Steel Foundry Co.; G. A. Murphy, Edward F. Christensen; O. E. Peterson, Foundry Supplies Co.; H. J. Pfeifer, Electro Metallurgical Sales Corp.; L. D. Pridmore, International Molding Machine Co.; E. Pritchard, Western Materials Co.; A. K. Sanderson, Love Bros. Inc.; F. Schaub, Calumet Steel Castings Corp.; J. B. Skelly, Hines Flask Co.; E. W. Smith, Lindahl Foundry Division, American Gear & Mfg. Co.; H. Swanson, Arrow Pattern & Foundry Co.; C. O. Thieme, H. Kramer & Co.; K. W. Van Brunt, Howard Foundry Co.; and C. P. Wright, American Brake Shoe Co.—*Erle F. Ross.*

Northeastern Ohio

ATTENDANCE at the opening meeting of the Northeastern Ohio Chapter, AFA, held at the Cleveland Club on Sept. 12 was extremely gratifying to both officers and directors. More than 200 members and guests were present to hear Ralph L. Lee, General Motors Corp., Detroit, give an inspirational talk on "Humanics in the Foundry." He pointed out that while a wide variety of instruments and equipment is available for determining accurately measurements of various kinds, there is none for

(*Continued on page* 164

SOUTHERN CALIFORNIA: General view of members of Southern California Chapter of the AFA at their ninth annual summer stag outing at Lakewood Country Club, Long Beach, Calif., Aug. 10


100 POUNDS
NET WEIGHT
MOGUL
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CEREAL
BINDER
MOGUL is a perfect Green Bond, which increases permeability in cores. Use MOGUL in cores for both green and dry strength.
MOGUL works with core oil because it decreases drying time and yields smooth cores. MOGUL works perfectly with pitch or rosin, too, because cores can be handled while still warm. MOGUL is widely used with sharp sands.
KORDEK
KORDEK is a perfect DRY BOND. It can be used in smaller quantities than most dry binders. KORDEK produces better castings with fewer discards.
CORN PRODUCTS SALES CO.
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(*Continued from page* 162)

gaging the characteristics of that most important factor in industry—the human element. Notwithstanding that lack of a measuring instrument there are a number of facts regarding human behavior which when properly co-ordinated and applied knit a group of heterogeneous individuals into a smoothly functioning organization.

Dr. Lee pointed out that each individual is different and a law unto himself, and in any group will be found characteristic types such as the bully, the smoothy, the clown, the timid soul, the pouter, the creative genius, the tattletale, and the composite or normal average individual who is in the majority and in the driver's seat as far as society is concerned. Since all are different, and are adamantly resistant to change, there is no standardized approach to the miscellaneous temperaments and types. Hence, mutually satisfactory employee relationships can only be built up through man-by-man and man-to-man contacts.

Since individuals cannot change to any large extent they should be helped to develop along lines of their natural inclinations, and employed to the best advantage according to their capabilities. Individuals are not the same all the time, and their behavior varies likewise. Hence, it is necessary to keep in close contact with them to learn and to know the causes and effects, and be able to handle situations as they arise in the most considerate manner. Everyone is proud of being different, and appreciates recognition of that fact. Most people do the things they do because they feel like doing them, and not because they think they should. Feeling is the great cost-reducing and production-increasing tool with pride at the heart of it.

Dr. Lee said that use of the same kind of fact finding honesty, ingenuity and faith employed so successfully in solving mechanical problems, in approach to the solution of human behavior problems, will produce even greater results in terms of employee relations. In the past human beings and their behavior has been taken for granted. Now heads instead of emotions must be used in the great field of humanics.—*Edwin Bremer.*

Northern California

NORTHERN California Chapter of the AFA, in co-operation with a number of other technical societies, presented a High Frequency Heating Conference in the auditorium of the Pacific Gas & Electric Co., San Francisco, Sept. 5-6. J. H. Gumz, Pacific Gas & Electric Co. was general chairman.

Among the papers presented were those by J. F. Aicher, E. A. Wilcox Co. and secretary of the Northern California Chapter, on "Melting of Metals with Induction Heating," and by D. Hansen Grubb, Pacific Scientific Co., on "Baking of Foundry Cores by Dielectric Heating."

High frequency heating, both induction and dielectric, appears to have tremendous possibilities in its application to many industrial processes. For this reason it was felt that Northern California industries should be acquainted with the new methods, processes and equipment and have an opportunity to exchange views and ask questions about this new industrial tool.

Wisconsin

THE season's first dinner meeting of the Wisconsin Chapter of the AFA was held Sept. 13 with about 285 members and guests present. The dinner was served in the Crystal ballroom of Hotel Schroeder, Milwaukee, and sectional discussions were held in five other banquet rooms after the dinner. It was the first dinner meeting at which the new president, David Zuege, presided, the gavel having been turned over to him at the May meeting by retiring president John Bing. At each plate members found a copy of the "AFA Report to the Membership—1945-1946," sections of which President Zuege quoted while addressing the assembly on affairs of the local chapter.

The president took particular pride in announcing that, next to the Chicago Chapter, the Wisconsin group has the largest number of members. The July golf tournment and outing was reported by him as having been the most successful the group has ever held, with a total attendance of 645 members and guests, 162 of whom played golf.

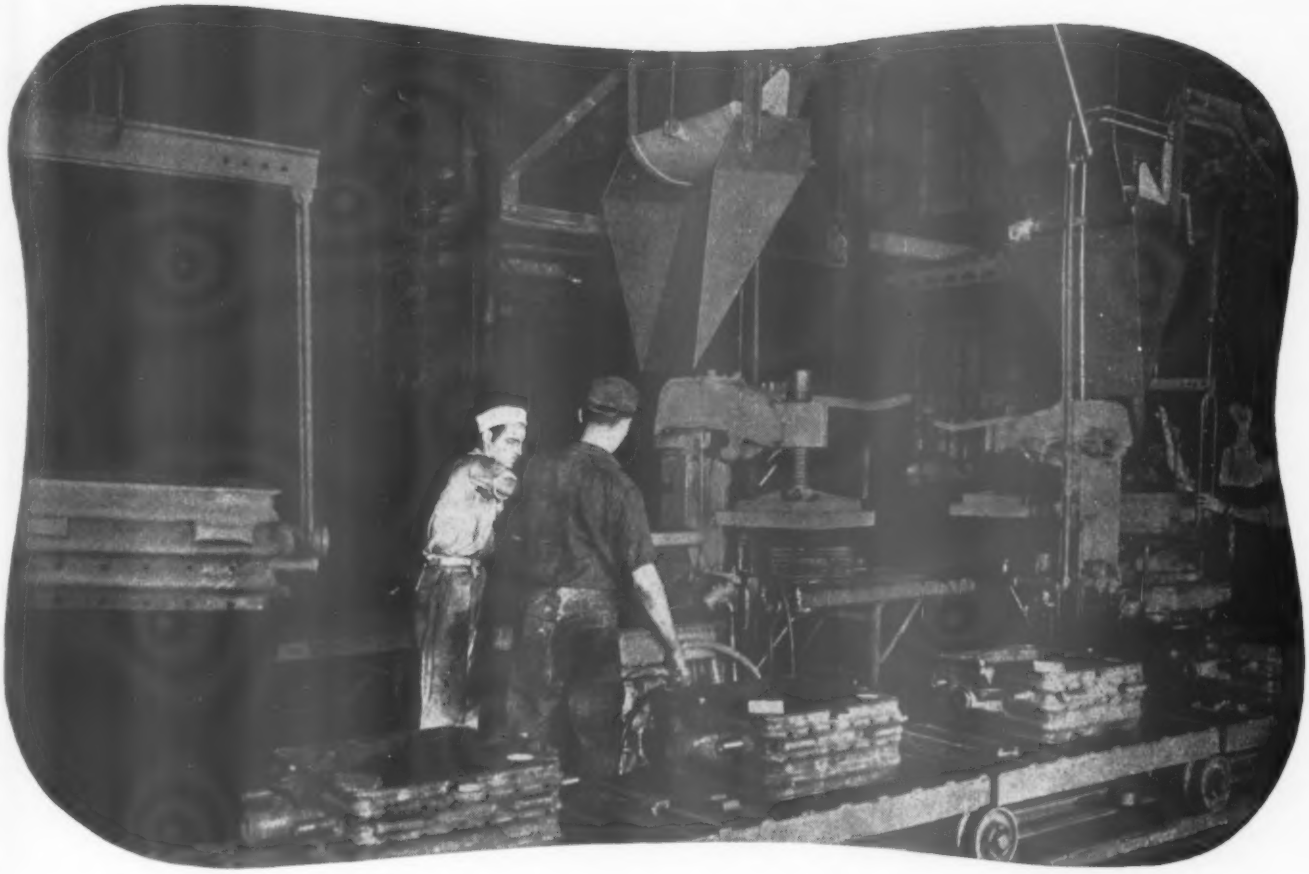
The educational committee, President Zuege declared, had a successful start, in the past few weeks two out of eight applicants as assistants at the University of Wisconsin foundry laboratory having been selected. The university has set up a program enabling two young men to work in the school's foundry laboratory, at the same time acquiring a degree in the Department of Mining and Metallurgy. The men will work in the foundry laboratory about eight hours weekly, and carry a scholastic schedule of 12 to 14 credits toward their degree. To be eligible, the candidates for appointment must meet the scholastic entrance requirements of the university and must have had some practical experience in the foundry industry which they can introduce into the foundry laboratory work given students of the university.

A large number of new members were announced by President Zuege, who also reported that the new directory of members would be issued within a few weeks.

At the sectional meetings following the dinner the pattern group took the subject of "Pattern Requirements of a Production Foundry," with H. Holding, International Harvestor Co., the speaker and A. M. Fischer, the Chas. Jurack Co., as chairman.

(*Concluded on page* 166)

CONFERENCE COMMITTEE: Organizing committee for the Eastern Canada and Newfoundland Chapter's Regional Conference held Sept. 27-28, in Charlottetown, Prince Edward Island, Canada. Left to right, lower row—E. N. Delahunt, H. Louette, W. Brown, A. E. Cartwright, R. E. Cameron. Upper row—E. Jennings, J. Newman, A. Allard, A. Hughes, M. McQuiggan



Eliminate Back and Head Aches

Save your men the tiring, tedious work of lifting, bending, shoveling with Bartlett-Snow foundry equipment,—and you'll reduce your own headaches too. Individually engineered to your particular and individual requirements, based on our long and successful experience in this work, a Bartlett-Snow installation will give you a maximum of both quantity and quality from your plant. Costs go down. Your product finds readier sale. The workmen get larger take home pay—easier—like their jobs better. Absenteeism and turnover are much reduced. And the smoother, more even, more continuous production means bigger profits, larger dividends for you. Can we send you more details?

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ENGINEERING REPRESENTATIVES IN THE PRINCIPAL CITIES

FOUNDRY SAND, MOLD AND CASTINGS HANDLING

(*Concluded from page* 164)

"Core Blowing and Recent Developments in Molding Machines" was the topic for the malleable iron group. Lawrence D. Pridmore, International Molding Machine Co., Chicago, was the speaker and C. M. Lewis, Badger Malleable Mfg. Co., was chairman.

The steel group heard a talk on "Solidification of Steel Castings" by Charles Christopher, Continental Foundry & Machine Co. S. E. Mueller, the Falk Corp., was chairman.

Arthur Higgins, Allis-Chalmers Mfg. Co., presided over the nonferrous group, whose topic for discussion was "Foundry Costs, or How to Stay in Business."

The gray iron and technical groups met jointly for a talk on "Chemical and Physical Properties Used in Application of Common Foundry Binders" by J. A. Gitzen, Delta Oil Products Co. M. A. Dantzler, Rundle Mfg. Co. and J. V. Olle, Motor Castings Co., presided.—*John E. Hubel.*

Appoint Members of Steel Committee

H. H. Blosjo, Minneapolis Electric Steel Castings Co., Minneapolis, has been reappointed chairman of the Steel Division program and papers committee of the American Foundrymen's Association for 1946-47. Other appointments to the committee are: E. C. Troy, Dodge Steel Co., Philadelphia, vice chairman; J. A. Duma, Norfolk Naval Shipyard, foundry division, Portsmouth, Va.; J. A. Rassenfoos, American Steel Foundries, East Chicago Ind., and Gosta Vennerholm, connected with Ford Motor Co., Dearborn, Mich.

Offers Suggestions For Manuals

Material useful in planning or revising company employee manuals is contained in the report, "Information Manuals for Employees," prepared by the Policyholders Service Bureau, Metropolitan Life Insurance Co., 1 Madison Ave., New York 10, and available to executives on request. This illustrated review is based on an analysis of 132 manuals of 119 companies in the United States and Canada. It contains sections on the essential contents of an information manual, suggestions for making the manual attractive and readable and excerpts from manuals of various companies.

Book Review

American Management Association, 330 West 42nd St., New York 18, has published a series of booklets on personnel problems. The booklets are paper bound and measure 6 x 9 in. Price $.75 each.

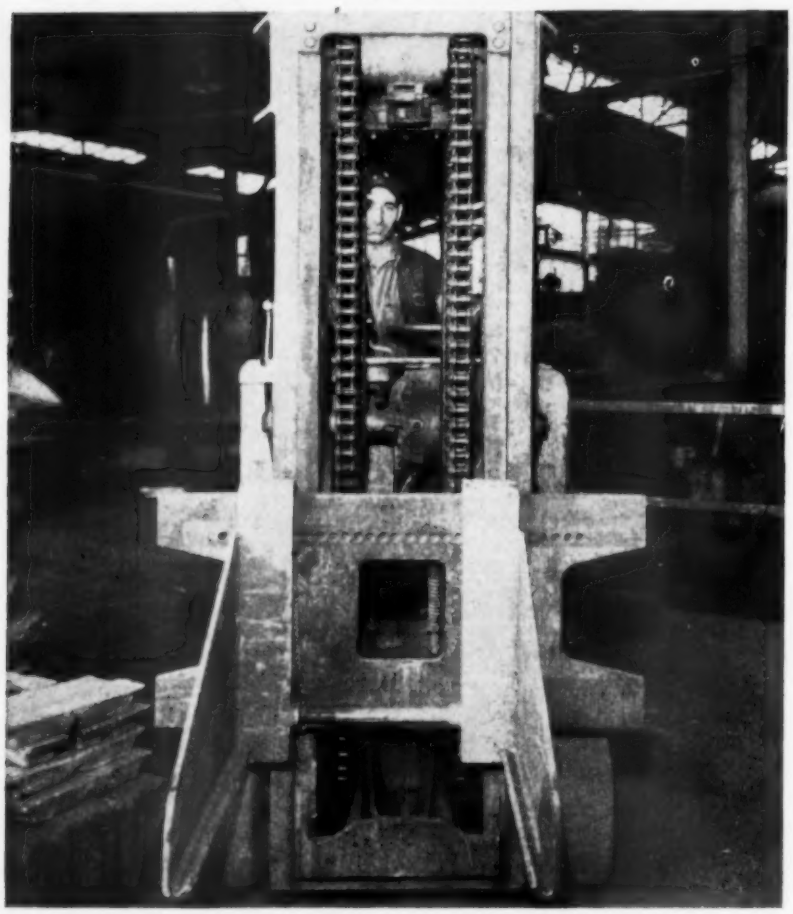
The booklets contain information presented in papers by men of industry, colleges and churches at the personnel conference of American Management Association held in Chicago, February, 1946.

Personnel series booklet number 97, *New Concepts in Collective Bargaining*, contains papers on "Labor Relations Today," "Fact Finding and Ability to Pay," "Salient Characteristics of Postwar Union Agreements" and "Implications of Company Security Against Stoppages."

Number 98, *Reconciling Labor and Management Philosophies*, contains, "The Common Goal of Management and Labor," "Labor and Management Look Ahead," and "Labor, Management and Congress." Number 99, *Constructive Employee Relations in Unionized and Non-Unionized Plants*, contains, "Areas for Labor-Management Co-operation," "Labor Relations in a Non-Unionized Company" and "Employee and Public Relations."

Number 100, *Rating and Training executives and Employees*, contains, "Employee Selection for the Average Company," "Techniques of Merit Rating," "Executive Development" and "Interpretation of Personnel Reports."

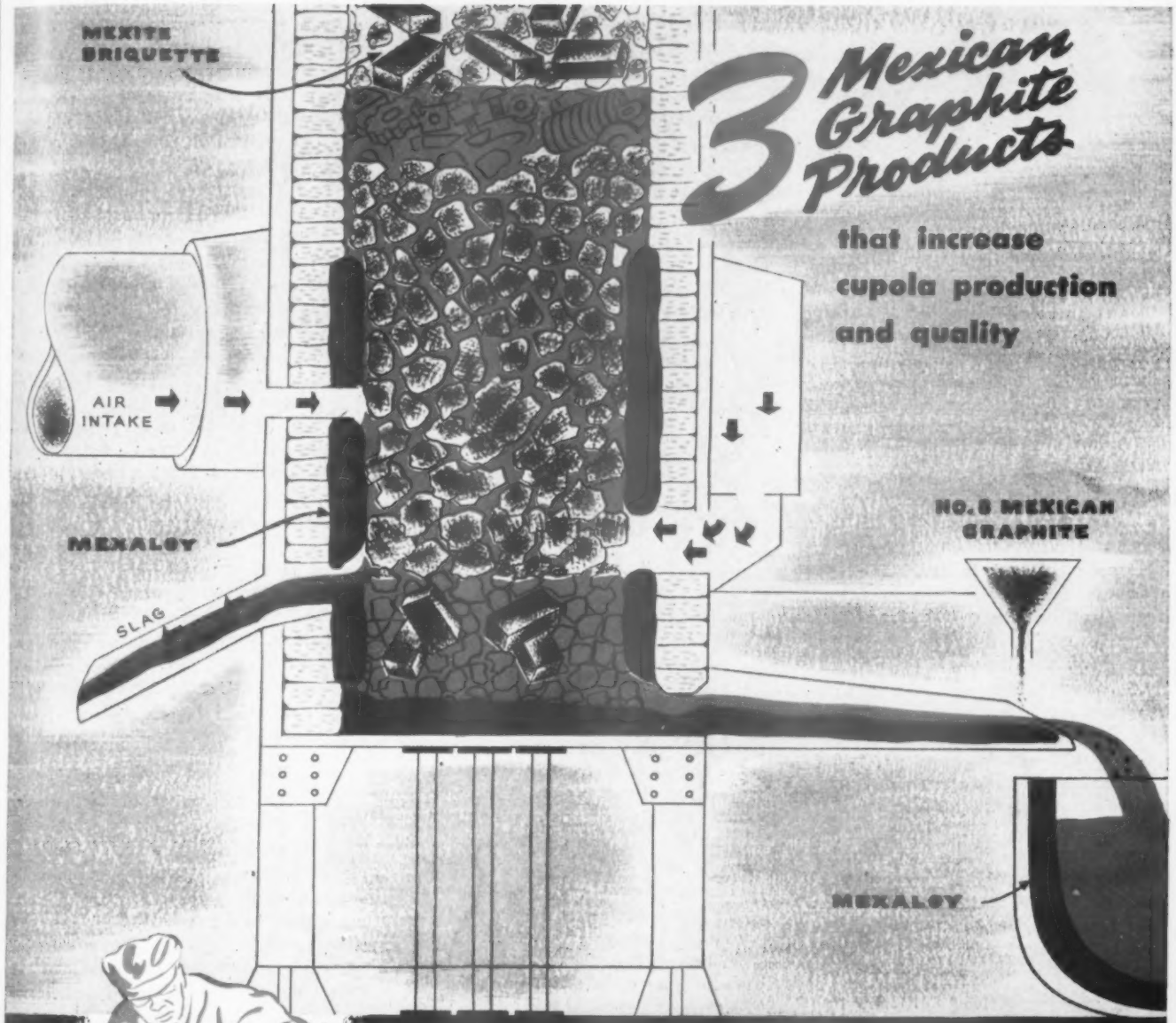
An Easier Way To Handle Ingots



ONE of the harder jobs in foundries and smelters is the manual handling and stacking of ingots. A large number of lost-time accidents can be traced to injuries to hands and legs of men who wrestle such metal.

One material handling man with a plan for simple solutions dreamed up this answer to the problem. It has solved pick-up, carry and stacking problems with shallow-draft ingots.

Using his Yale high-lift fork truck as a base, he instructed his welding foreman to cut and assemble a pair of adjustable side lift plates which he could position as required on the front lift planel of the electric truck. The lip on the narrow flanges easily slipped under the ears of low draft ingots. The solid side walls guided and supported the stack. With one man operating the electric truck, the user found he was able to handle all ingot moving and stacking problems as a part-time operation, where formerly this work required the full time of four to six men. (Photo courtesy of Yale & Towne Mfg. Co., Philadelphia Division).



3 Mexican Graphite Products

that increase cupola production and quality

MEXITE BRIQUETTES. One 4-lb. Mexite Briquette provides the same carbon content as 50 lbs. of pig iron when introduced into the cupola charge. Not only do Mexite briquettes sharply reduce melting costs per ton, they also reduce the range of carbon content fluctuation and give a steadier carbon analysis, a particularly vital factor when high percentages of steel are charged.

MEXALOY, applied to cupola linings, ladles, and spouts, resists molten metal and slag and keeps metal free from refractory inclusions. Its natural lubricating action provides low friction surfaces which part easily from metal and slag. A Mexaloy mixture is easily applied to any clean surface. Because it will not melt or change character under intense heat, Mexaloy gives longer refractory life with lower maintenance cost.

NO. 8 MEXICAN GRAPHITE is used for ladle additions to treat grey cast iron. Trickled into the cupola spout as metal falls into the ladle or with a direct ladle addition, it greatly reduces chill and hardness, producing castings of increased machineability. Normally only 2 lbs. of No. 8 need be added per ton of molten metal—a cost of only ten cents per ton—to assure castings which require no annealing. Write today for complete information on how Mexite Briquettes, Mexaloy, and No. 8 Mexican Graphite will give you better castings for less money.

THE UNITED STATES GRAPHITE CO. • SAGINAW, MICHIGAN

How To Correct Foundry Waste

(*Continued from page* 95)

maximum diagonal greater than 21.6 in.

In addition to providing for proper sizing and weighing of the cupola charge materials, the correct coke or metal charge should be selected to achieve an outstanding melting operation. If a 72-inch ID cupola is being operated, the proper weight unit of the coke and metal charge should be calculated for that size cupola.

If the cupola is to be operated beyond the trial-and-error level to uncover the optimum of which it is capable, then the weight of the coke charge should not exceed 10 lb of coke per sq ft of cupola area. To use 7.5 lb of coke per sq ft of cupola area would be still better. As a 72-in. cupola has an area of 28.3 sq ft, the maximum intermediate coke charge should not exceed 283 lb, but a 7.5 x 28.3 or 212-lb coke charge would be better. In the overall gray iron foundry industry this weight unit of intermediate coke charge per sq ft of cupola area varies from 5 to 30 lb. If gray iron foundry operations be analyzed, it would be found that there is considerable variation from one foundry to another and also in any one foundry where different size cupolas or different types of gray iron are melted.

Amount of Coke Required

A basic question might be, "How much coke is required to melt and superheat a ton of gray iron to 2850 F?" Determined by scientific principles, the answer is, "140 lb of coke." This is the amount of coke reacting with oxygen to generate heat and does not include the amount of coke used to carburize iron. It is the amount of coke reacting thermally when 65 per cent of the theoretical heat value of the coke is used to melt and superheat iron. When carbon is burned to carbon monoxide only 4400 Btu are generated per pound of carbon, but when carbon is burned to carbon dioxide 14,500 Btu are generated per pound of carbon.

The chemical engineer would call the cupola melting process a counter current heat transfer process, with heat generated near the bottom of the cupola while cold materials are charged some 15 or 20 ft above this point, with cold materials moving downward and heat moving upward. While dealing with a highly efficient heat transfer process, it still must be decided whether to do a job with X pounds of coke burned efficiently or with 3X pounds of coke burned inefficiently, or compromise at some point in between these extremes.

Cost of fuel in the cupola melting process is a small item in the total cost of producing a ton of good castings and no worthwhile appraisal of the importance of fuel in the process accrues when evaluated solely from the viewpoint of fuel costs or fuel savings per ton of good castings produced. To a large extent the selection of components in the iron charge is influenced by fuel. This point was illustrated before where the 3.35 per cent cylinder block was produced from one type of charge containing 2.75 per cent carbon or from another charge containing 2.55 per cent carbon. We can safely assume that one charge has a greater steel component than the other with complementary adjustments in silvery pig or concentrated forms of silicon and manganese.

Fuel Affects Carbon Content

The two types of charges differ in cost; one costs more or less than the other to produce the same quality and products. This difference in cost of metal charge is likely to be several times the amount of fuel savings. The quality of the cupola product is closely associated with the chemical element carbon. If the best cylinder block that an automotive foundry knows how to make is made of an iron containing 3.35 per cent carbon, then cylinder block irons running 3.35 per cent carbon throughout each day's melting cycle and reproduced day after day to infinity is the foundry's objective. If the carbon varies, say to 3.55 per cent carbon, it can be assumed that the quality of the block has suffered and the importanace of fuel in the melting process has extended considerably beyond the viewpoint of fuel cost or fuel savings.

What is the proper height of the cupola coke bed? The proper height has been established by trial-and-error methods by selecting some arbitrary height, then timing the cupola at the tuyeres or tap hole. Iron appearing at the tuyeres or tap hole too soon is indicative of too low a bed and vice versa. In the overall foundry industry coke bed heights vary from 24 to 80 in. The distance is measured from the top cover plate of the main row of tuyeres to the top of the coke bed and excludes the depth of coke in the well and tuyere zones.

When this measurement is taken after the coke bed has burned through "white hot," which assumes that all light-up wood, unfilled pockets, etc., are eliminated, the proper height of the coke bed may be determined by the formula: Bed height in inches of coke above the level of the top cover plate of the main row of tuyeres (and irrespective of use of one or more rows of upper tuyeres), is equal to $10.5 \vee P + 3$, when P is the cupola wind box pressure in ounces. This is the height when low carbon irons, i.e., 2.76 per cent C or lower, are desired, and particularly when the requirement is for the first iron melted. With medium carbon irons, i.e., 3.25 per cent or higher, I use 3 more inches of coke, or use the formula B.H. $= 10.5 \vee P + 6$. The respective bed heights with wind box pressures of 16, 25, 36 or 49 oz would be 48, 58.5, 69 and 79.5 in. When coke beds are too high they adjust themselves over the beginning melting period to some lower height when chemical equilibrium conditions are reached, but the iron melted in this period is higher in carbon than desired.

When coke bed heights are too low, overall foundry operations are off to a bad start, for carbons are likely to be low, silicon and manganese oxidation losses high, with metal temperature low and getting worse. It is difficult to readjust the bed height during operation. Usually low bed heights reflect abnormally large intermediate coke charges.

Five Zones in Cupola

There are five zones in the cupola: Zone 1, from charging down to melting zone, is a preheating zone. Zone 2 is the melting zone. Metal leaves the melting zone at its melting point and if it is not superheated it quickly loses its heat of fusion and reverts from liquid to solid. Zone 3 is a superheating zone where the metal temperature is raised above its melting point by some 500 F. It is this zone in which we are most interested, since this is the zone over which we have considerable control. If fuel is burned in complete combustion the heat release per cubic foot of cupola volume is high and, therefore, the temperature in the super-heating zone is high. When fuel is burned in incomplete combustion, the heat release per cubic foot is low and the temperature in the superheating zone is less.

In addition to thermal conditions in the superheating zone, the length of this zone may be short or long. A 72-in. cupola has a nominal melting rate of 11.1 lb of metal per second (666 lb per minute or 20 tons per hr), but it will usually render a reasonably satisfactory melting performance between 5.5 and 16.6 lb of metal per second. The length of the superheating zone is greatest with the highest melting rate and least with the lowest melting rate.

High thermal conditions in the superheating zone depend on whether the intermediate coke charge is 20, 15, 10 or

(*Continued on page* 174)

THE IMPROVED Redford CORE BLOWER

CARTRIDGE BENCH TYPE

Users report remarkable increases in quality and quantity of production.

When making cores from horizontally split boxes, the work of placing driers and drawing the box is done on the base of the machine

Produces variety of intricate cores with unusual speed and simplicity.

Comes ready to use—virtually no installation cost.

Can be operated with unskilled labor—extremely easy to use.

If you make cores 2 lbs. or under—this unit ideally suited to your use.

Designed by practical foundrymen.

WRITE for
complete details and new booklet.

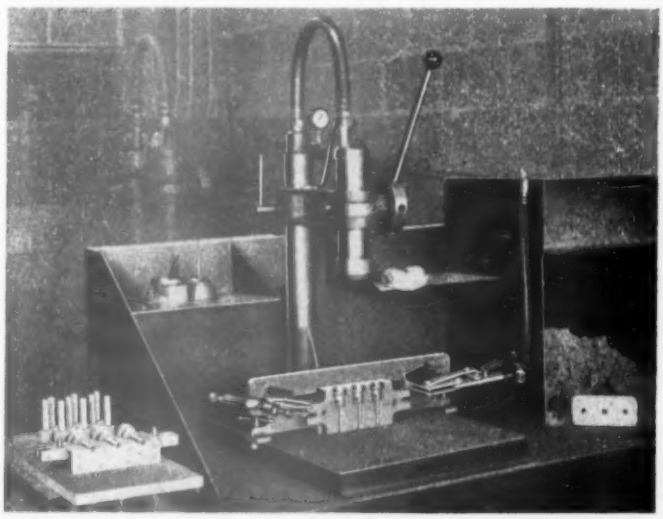
FILLS NEED FOR SIMPLE, FLEXIBLE CORE BLOWER

The New *Redford Bench Core Blower* has met with enthusiastic acceptance by foundrymen because it supplies an important need in the foundry for an efficient, low-cost method of blowing small, intricate cores. It requires no large volume of air and readily lends itself to handling a variety of core boxes. In fact, they tell us that it is the ideal method of making cores in single or gang boxes requiring a maximum of 2 lbs. of sand.

SAND CARTRIDGES AVAILABLE IN 9 STANDARD SIZES

Blower comes complete, ready to use. Each blower provided with one Size "C" sand cartridge which is adaptable to a large range of core boxes. Cartridges are available in eight additional standard sizes and special sizes furnished where needed.

If you have any Core Blowing Problems write or call our Engineering Department. We will change your present equipment for blowing or assist you in designing proper equipment.



The Core Box Clamping Attachment is used when blowing split core boxes vertically (on end). It is quickly adjustable to permit use of different size core boxes. Changeover requires only a few minutes

Redford IRON & EQUIPMENT CO.

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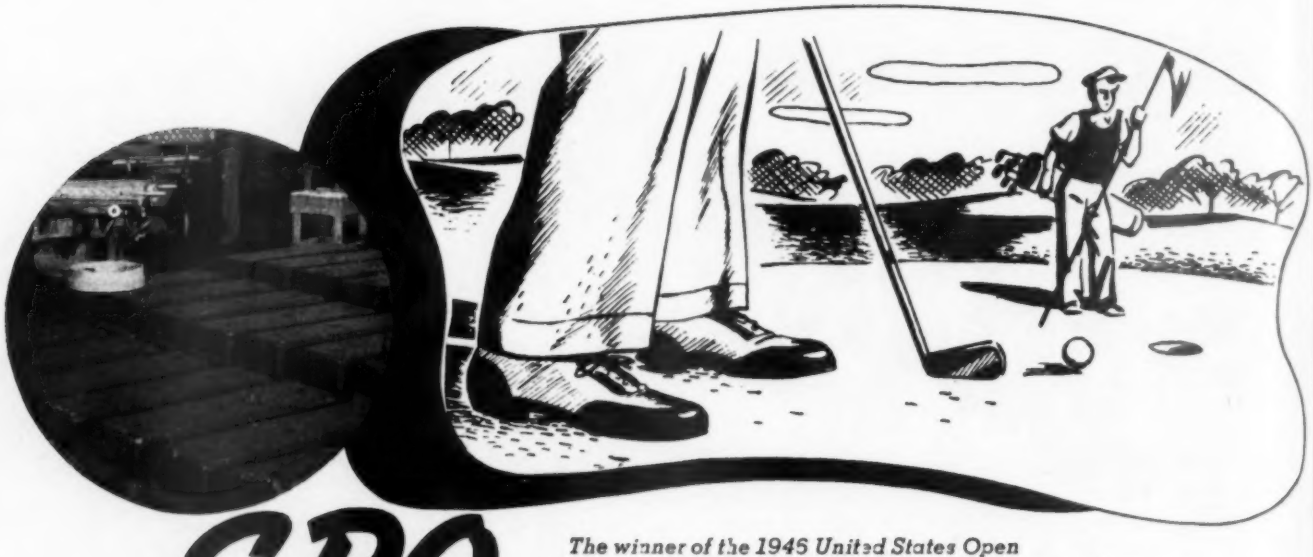

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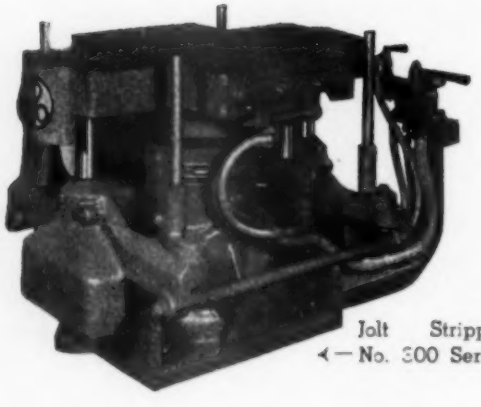

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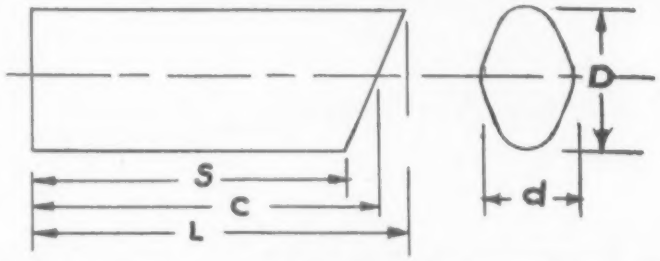
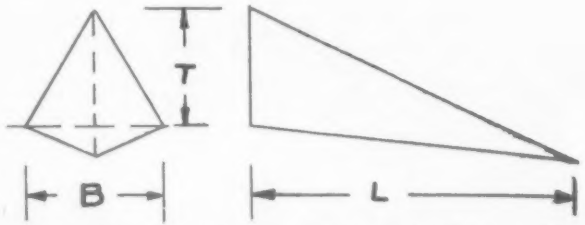
FORMULAS FOR DETERMINING THE WEIGHTS OF CASTINGS



To find the weight of a truncated elliptical cylinder, multiply the small diameter by the large diameter, by the distance on the center line from the base to the inclined section, by the value of k. C is equal to one-half the sum of S and L.

$$W = D\ d\ C\ k$$



To find the weight of a triangular pyramid, multiply the width of the base by its thickness, by the length, by the constant, k, corresponding to the weight per cubic inch of material used. (See Table IV).

$$W = B\ T\ L\ k$$

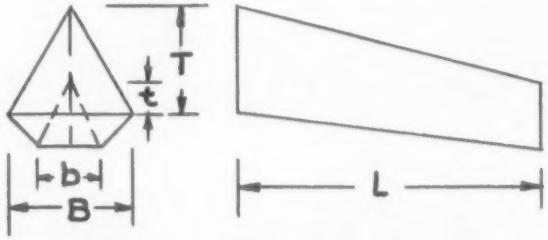
Table IV

Wt. per cu. in.	k	Wt. per cu. in.	k	Wt. per cu. in.	k	Wt. per cu. in.	k	Wt. per cu. in.	k	Wt. per cu. in.	k
.096	.0160	.170	.0283	.250	.0417	.330	.0550	.410	.0683	.490	.0817
.100	.0167	.180	.0300	.260	.0433	.340	.0567	.420	.0700	.500	.0833
.110	.0183	.190	.0317	.270	.0450	.350	.0583	.430	.0717	.510	.0850
.120	.0200	.200	.0333	.280	.0467	.360	.0600	.440	.0733	.520	.0867
.130	.0217	.210	.0350	.290	.0483	.370	.0617	.450	.0750	.530	.0883
.140	.0233	.220	.0367	.300	.0500	.380	.0633	.460	.0767	.540	.0900
.150	.0250	.230	.0383	.310	.0517	.390	.0650	.470	.0783	.550	.0917
.160	.0267	.240	.0400	.320	.0533	.400	.0667	.480	.0800	.560	.0933

Interpolation Table

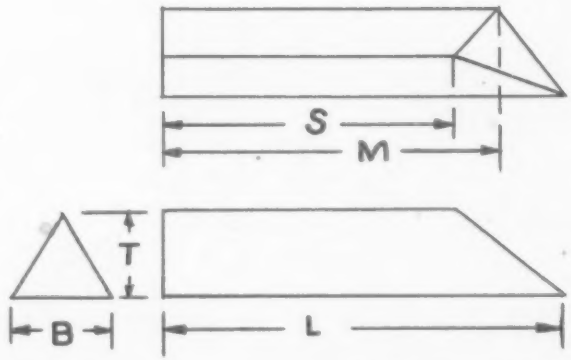
Additional Wt	Additional k	Additional Wt.	Additional k	Additional Wt.	Additional k
.001	.0002	.004	.0007	.007	.0012
.002	.0003	.005	.0008	.008	.0013
.003	.0005	.006	.0010	.009	.0015

For method of interpolation see Table II.



To find the weight of a frustrum of a triangular pyramid, first find the sum of the products of the breadth of the large base by its thickness, the breadth of the small base by its thickness, and the breadth of the large by the thickness of the small base; then multiply this sum by the length by the value of k and the product is the required weight.

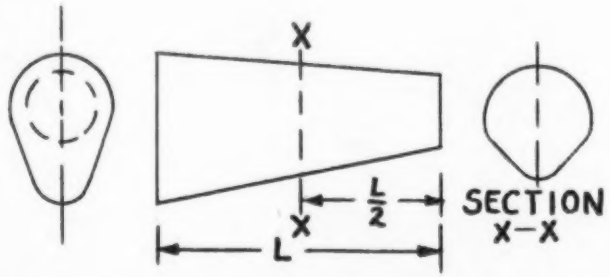
$$W = (BT + bt + Bt)\ L\ k$$



To find the weight of a truncated triangular casting, multiply the thickness of the base, by its breadth, by the sum of the lateral edges, by the value of k.

$$W = TB\ (L + M + S)k$$

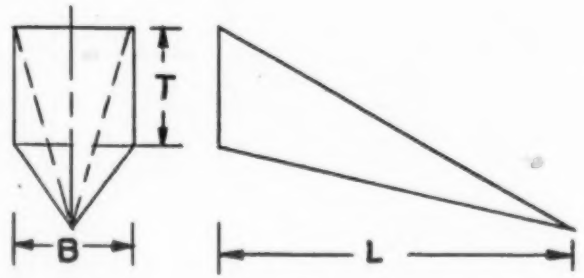
FORMULAS FOR DETERMINING THE WEIGHTS OF CASTINGS



To find the weight of a prismoid or solid generated by a straight line moving over the boundaries of two parallel ends, multiply the sum of the area of the large end, four times the area of the mid-section and the area of the small end by the length, by the value of k.

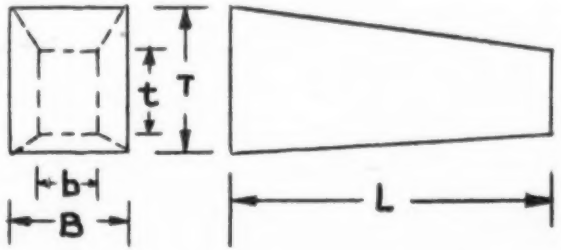
$$W = (A + 4M + E)\, L\, k$$

A = Area large end.
M = Area mid-section, X-X.
E = Area small end.



To find the weight of a pyramid with a rectangular base, multiply the thickness of the base by the breadth, by the length, by the constant, K, corresponding to the weight per cubic inch of material used. (See Table V).

$$W = T\, B\, L\, K$$



To find the weight of a frustrum of a rectangular pyramid, first find the sum of the products of the breadth of the large base by its thickness, the breadth of the small base by its thickness and the breadth of the large by the thickness of the small base; then multiply this sum by the length, by the value of K and the product is the weight required.

$$W = (BT + bt + Bt)\, L\, K$$

Table V

Wt. per cu. in.	k	c	Wt. per cu. in.	k	c	Wt. per cu. in.	k	c	Wt. per cu. in.	k	c
.096	.0320	.3016	.210	.0700	.6597	.330	.1100	1.037	.450	.1500	1.414
.100	.0333	.3142	.220	.0733	.6912	.340	.1133	1.068	.460	.1533	1.445
.110	.0367	.3456	.230	.0767	.7226	.350	.1167	1.100	.470	.1567	1.477
.120	.0400	.3770	.240	.0800	.7540	.360	.1200	1.131	.480	.1600	1.508
.130	.0433	.4084	.250	.0833	.7854	.370	.1233	1.162	.490	.1633	1.539
.140	.0467	.4398	.260	.0867	.8168	.380	.1267	1.194	.500	.1667	1.571
.150	.0500	.4712	.270	.0900	.8482	.390	.1300	1.225	.510	.1700	1.602
.160	.0533	.5027	.280	.0933	.8796	.400	.1333	1.257	.520	.1733	1.634
.170	.0567	.5341	.290	.0967	.9111	.410	.1367	1.288	.530	.1767	1.665
.180	.0600	.5655	.300	.1000	.9425	.420	.1400	1.319	.540	.1800	1.696
.190	.0633	.5969	.310	.1033	.9739	.430	.1433	1.351	.550	.1833	1.728
.200	.0667	.6283	.320	.1067	1.005	.440	.1467	1.382	.560	.1867	1.759

Interpolation Table

Add'l Wt.	Add'l K	Add'l C	Add'l Wt.	Add'l K	Add'l C	Add'l Wt.	Add'l K	Add'l C
.001	.0003	.0031	.004	.0013	.0126	.007	.0023	.0220
.002	.0007	.0063	.005	.0017	.0157	.008	.0027	.0251
.003	.0010	.0094	.006	.0020	.0188	.009	.0030	.0283

For method of interpolation see Table II.

(To be continued)

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(*Continued from page* 168)

7.5 lb of coke per square foot of cupola area. Depth of the superheating zone depends on whether the cupola melting rate is 0.5, 1.0 or 1.5 times the nominal melting rate.

Zone 4 in the cupola is the tuyere zone and this must be regarded as a drastic cooling zone. Close to 1 lb of air at temperature varying from 0 to 500 F (depending on whether air is preheated or not), is passed into this zone for each pound of metal passing through. This one-to-one ratio between pounds of air entering the tuyere zone and pounds of metal passing through that zone actually ranges between 0.8 and 1.2 lb of metal per lb of air. The best ratio between metal and air occurs when the cupola is operated at highest thermal efficiency.

Zone 5 is the well zone, the cooling zone. Here metal temperature decreases with time. Zone 5 is also a chemical change zone, in that carbon is dissolved in proportion to metal temperature, time in the zone and degree of saturation of iron by carbon consistent with its chemistry (silicon, phosphorus, chromium, etc.).

Good controlled cupola operation will, to a large extent, save gray iron foundries many hundreds of thousands of dollars each year. If cupola practice is correct, the spout temperature high, the pouring temperature correct, the moment an unwarranted amount of scrap appears from a certain casting the correction of the cause will be simpler.

Now, let us consider coremaking and the waste that can be caused. We have hard cores, soft cores, wet cores, green cores, burned cores and ventless cores. All result in many headaches and sleepless nights. The one big thing that causes more difficulty than anything else in corerooms is the utter disregard of control in the preparation of the core sand mixture.

Some foundries use a scoop shovel to measure the sand; and sometimes the measure is full, and most times it is half full. Some people use a conventional wheelbarrow, sometimes full to overflowing and sometimes three-quarters full. The oil, cereal binders, etc., are measured in the same careless way. Such methods, it is obvious, cause bad cores and, ultimately, bad castings.

It is a simple matter to construct a sand measuring unit that can be struck off when level full to assure some control of the amount of sand used per batch. Cereal binders can and should be measured in containers kept in good repair. Oil is the most expensive of the raw materials used in core sand and should be measured very accurately, first to give the oil a chance to show what it can do and, secondly, to save a few pennies.

The most accurate and best method of preparing core sand is to weigh each of the ingredients—sand, oil, binders and water. And, last but not least, keep the mixer in top repair so that best results are obtained with the ingredients used.

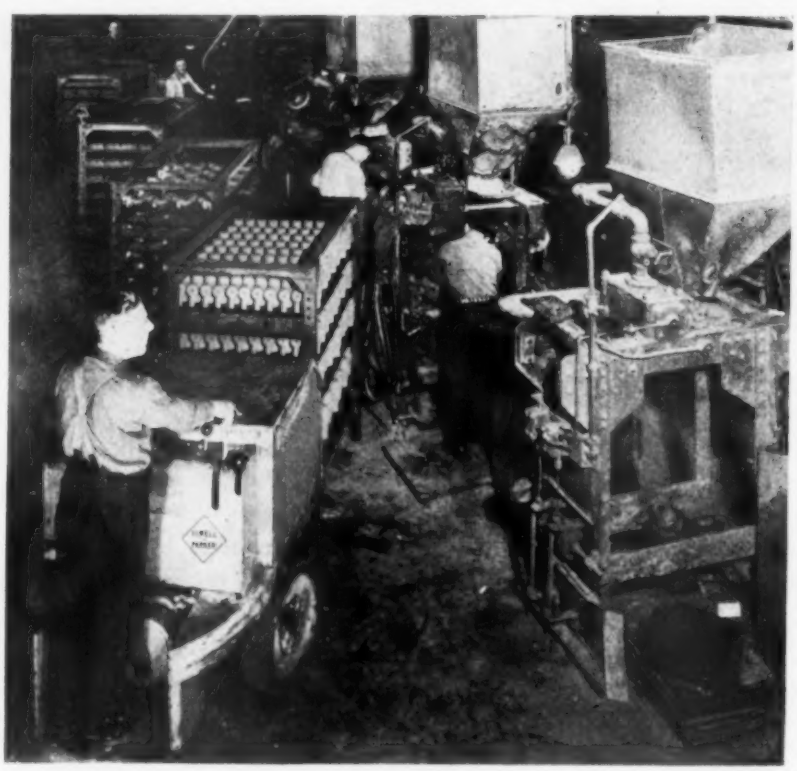
Blows Traced To Nails

Let me give you an example of what can happen in the assembling of cores. Not long ago I was in an automotive foundry that was experiencing a great deal of scrap on a water-jacketed diesel engine exhaust manifold. There were three bosses on the cope side which served no other purpose than to allow sufficient metal to bolt cover plates over the holes through which core prints projected to center the jacket core. Over a period of four months the foundry had been experiencing blows on one or more of these bosses in 40 to 60 per cent of the castings produced. This caused them to be scrapped. To stop this waste they tried different gating, checked core vents, added core vents, but the defect still persisted.

The core prints were rather thin, and to eliminate as much breakage as possible, nails were placed in the corebox before blowing to give added support. In the completed core in almost every casting, the nails cut through the side of the print, so they were covered with a soapstone patching material just before the cores were placed in the molds. Previously it had been noted that the soapstone and water mixture did not dry very rapidly, so core oil was added in the belief that the oil would hasten the drying. To the touch it did seem thoroughly dry but not so under the surface, and the result was a blow at each one of the patched places. The problem was solved by the elimination of the oil from the

(*Concluded on page* 176)

TRUCKS AID IN HANDLING CORES



ELECTRIC power trucks facilitate production of cores as illustrated above. In this case one truck serves a dozen coremaking machines working at capacity. It transports racks loaded with 1000 cores to baking ovens, removes them from the ovens, carries them into the foundry, then returns empty racks to machines where they again are loaded.

These coremaking machines are fully automatic, making as many as eight small cores in a box at a time through a cycle of one to three minutes depending on size of box, number of core compartments and other factors. The machine's operator removes cores and places them on skid-mounted steel racks which are picked up by the truck. Transportation of green cores without damage is facilitated by the type of leverage mechanism used in the truck. (Photo courtesy of Elwell-Parker Electric Co., Cleveland)

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(*Concluded from page* 174)

patching material, and after the patching application the cores were placed in the oven, for 20-30 minutes, and the casting blows disappeared.

The waste that should have been corrected previously in this example amounted to 1000 castings at $25 each.

The next department wherein waste might occur and sometimes does, is the molding department. There are many things to consider, such as the skill of the men producing the molds, condition of the sand, control of sand conditions, gating and risering and pattern equipment. A casting can be no better than the pattern from which it is made, as there are very few artists or sculptors left in the foundry industry. Flask equipment, condition of repair of equipment given the molders, and the pouring temperature of the iron are all factors.

In many foundries the sand is all bad and there is no hope of salvaging any part of it, yet the foundry will purchase all kinds of cure-alls to put into the heaps and systems, wasting a lot of time and money, and causing additional scrap when it would be better off by starting from scratch and throwing all the old sand in the dump. Of course, if the foundry has a sand washer and reclaiming unit that wouldn't be good practice.

Gates Are Either Good or Bad

The subject of gating and risering is one that has filled volumes, but there are two classifications of gates and risers —good and bad.

Some sound research work is now under way in one of the foremost laboratories in the country on some of the basic theories surrounding the making of a gray iron casting. We have taken for the gospel truth many of the existing theories and to date I have had my eyes opened by some of the facts already developed. The work is in progress at the Naval Research Laboratory, Anacostia Station, Washington, and was undertaken at the suggestion of the Technical Committee of the society.

This research work won't help much tomorrow or next week, so in the meantime castings must be made the best we know how today. The future of the industry will depend upon the sound castings produced.

The objective of good gating is to feed clean metal quietly into a mold. Gates should be arranged to meet the following requirements: 1. They must not erode sand or trap air. 2. They must not be responsible for hot spots or shrinkage cavities. 3. They must be as easily removed as possible in cleaning.

This may sound very elementary but it is good policy to think of basic points once in a while, and furthermore, adherence to the following rules is helpful in obtaining these objectives.

1. A round gate will pass more metal than a rectangular gate of equal cross-sectional area, since it has a lower surface area to volume ratio and lower surface friction.

2. The diameter of whirl gates should be greater than the sprue, and the gate forming the connection between the sphere and the whirl gate should have a larger cross-sectional area than that of the ingate.

3. Whenever possible, all gates should be formed as part of the pattern rather than by cutting with molder's tools, because gating systems formed with the pattern are less susceptible to erosion.

4. Ingates should be so directed that the incoming flow of metal takes place along natural channels in the mold.

5. Metal should enter the mold at as many points as possible in order to distribute the metal and reduce hot spots.

6. To run long castings, the ingate end of the mold should be lowered to compel the metal to run up a slight incline during pouring. By so doing, the metal rises in an unbroken manner with low surface area to volume ratio; hence chilling is reduced and more solid castings with improved surfaces are produced.

7. Area of the cross section of the ingate should be smaller than the cross section of the casting; otherwise when the gate solidifies it will tear the casting.

8. Section thickness of a casting must be considered in relation to pouring rate (rate of rise of metal in the mold per second), and it is common foundry practice to issue a relatively high pouring rate for light sections.

9. The ingate should not be choked at the entrance of the mold if it causes the metal to enter the mold at such a high velocity that a shower effect is produced. Besides excessive turbulence and oxidation, the mold may not be able to withstand this eroding force.

So much for gating, now let's look at some of the requirements which a satisfactory riser must meet.

1. The riser volume should be ample to compensate for the metal contraction within the area of the casting it is desired to feed.

2. Fluidity of the metal in the riser must be such that it can penetrate to the last contraction cavity within its sphere of influence.

3. Control of the riser with the casting must fully cover the area to be fed or be designed so that all the needed feed metal in the riser will pass into the casting. In this connection it has been my experience that side risers are most effective.

4. The riser should be effective in establishing a pronounced temperature gradient within the casting, so that the casting solidifies progressively from the coldest metal and smallest sections toward the heaviest section and hottest metal.

There are many things that could be discussed in connection with risers that space will not allow, such as the riser shape, height and contact with the casting, blind risers, combinations of blind and open risers, vents, etc. On the subject of vents it has been found that flat vents such as those made with a hack saw blade are more effective than either square or round vents.

There is a lot of waste at the shakeout and in cleaning rooms. In the shakeout gang a great deal of waste can occur through breakage and loss of castings, but the big fault here is in the preparation of the sand heaps at night in those shops that do not have sand units. Molders complain that the sand is too wet or too dry, which usually means that the molder cuts his heap over. Conditions vary with the shop and the types of sand used, but should use a portabl water meter and develop for itself the number of gallons of water required against the pounds of iron poured in the heap that day to bring the heap to temper. This is a very simple procedure and the meter costs about $18.

Cleaners Are Careless

There is waste in cleaning rooms because of breakage, carelessness on the part of grinders and chippers, and lax supervision. Many times the equipment is in poor repair and much time is needlessly wasted when a few dollars on repairs or a new piece of equipment would pay for itself in a short time. Then again there is the grinder who makes all kinds of figures on a casting with a hand grinder, removing small bumps that would not affect the casting in any way, rather than start work on another casting. Then there is the grinder who bears down too hard and cuts into the casting, and the chipper who knocks off lugs and pads that are necessary parts of the casting.

All these items cause waste in the gray iron foundry and there are a lot of legitimate excuses for this waste, but the excuse of inexperienced and low grade experienced help may become only an alibi if we can adopt a good program of personnel policies in our foundries and instruct our supervisors to give the new employee a sound course of indoctrination to the foundry. Those of us who are old hands accept the peculiarities and oddities of this industry as commo place, but to those who are new in the industry a foundry is a strange world and if given the proper introduction they, too, can reach the same conclusion we have—"that a foundry is a good place to work."

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IN FOUNDRY OPERATIONS: no need to spend a lot of time and money testing the practicality of new casting designs . . . the soundness and safety of proposed weight reduction . . . the correctness of foundry technics. With radiography you can quickly correct unsound practices . . . save enough thereby to more than pay for the radiographs used.

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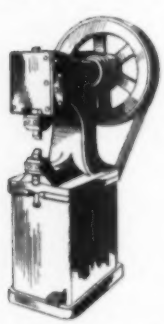

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MICROPOROSITY IN MAGNESIUM ALLOY CASTINGS

(*Continued from page* 101)

solidification is aided and abetted by the differential contraction between the alpha and beta (interdendritic) constituent generally has a smaller specific volume than the alpha phase, since it contains intermetallic compounds. Differential contraction, therefore, partly explains the reason that microporosity always occurs between the primary dendrites.

The main reason that it occurs between the primary dendrites is that the beta constituent between the dendrites is rich in zinc, as already explained on the basis of the phase diagram. When zinc is present in Mg-Al alloys, it shows marked tendencies toward hot-shortness, thus making the interdendritic material least able to withstand the tension stresses set up during contraction. The phenomenon is particularly noticeable in castings in which strong cores are used, which set up further tension stresses in the metal as it cools, due to the fact that they do not readily collapse. Because of this hot-shortness, the hot strength of the just-solidified zinc-containing constituent at the grain boundaries is very low and prone to tearing.

Zinc Promotes Hot-Shortness

Since zinc promotes hot-shortness, the tendency toward microporosity is increased by any mechanism such as coring whereby the zinc is concentrated in the interdendritic constituent of a two-phase alloy, particularly if differential contraction can occur. If it were possible to produce a single alpha phase magnesium alloy, considerable zinc could be added without harmful effects.

This fact indicates that microporosity at least can be minimized by the choice of a suitable alloy. The truth of this statement has actually been borne out by experience. For instance, Dowmetal C has been found to be less porous than Dowmetal H when produced by similar foundry procedures. Both Dow C and Dow H form both alpha and beta constituents. However, the zinc content of Dow C is lower than that of Dow H, (see Table I); therefore there is less tendency toward hot-shortness of the interdendritic constituent in Dow C. In addition, Dow C has a higher aluminum content than Dow H which permits better feeding in the microscopic sense defined previously. The higher aluminum content provides greater amounts of aluminum—rich constituents, which precipitate out at higher temperatures and feed into the shrinkage

(*Continued on page* 180)

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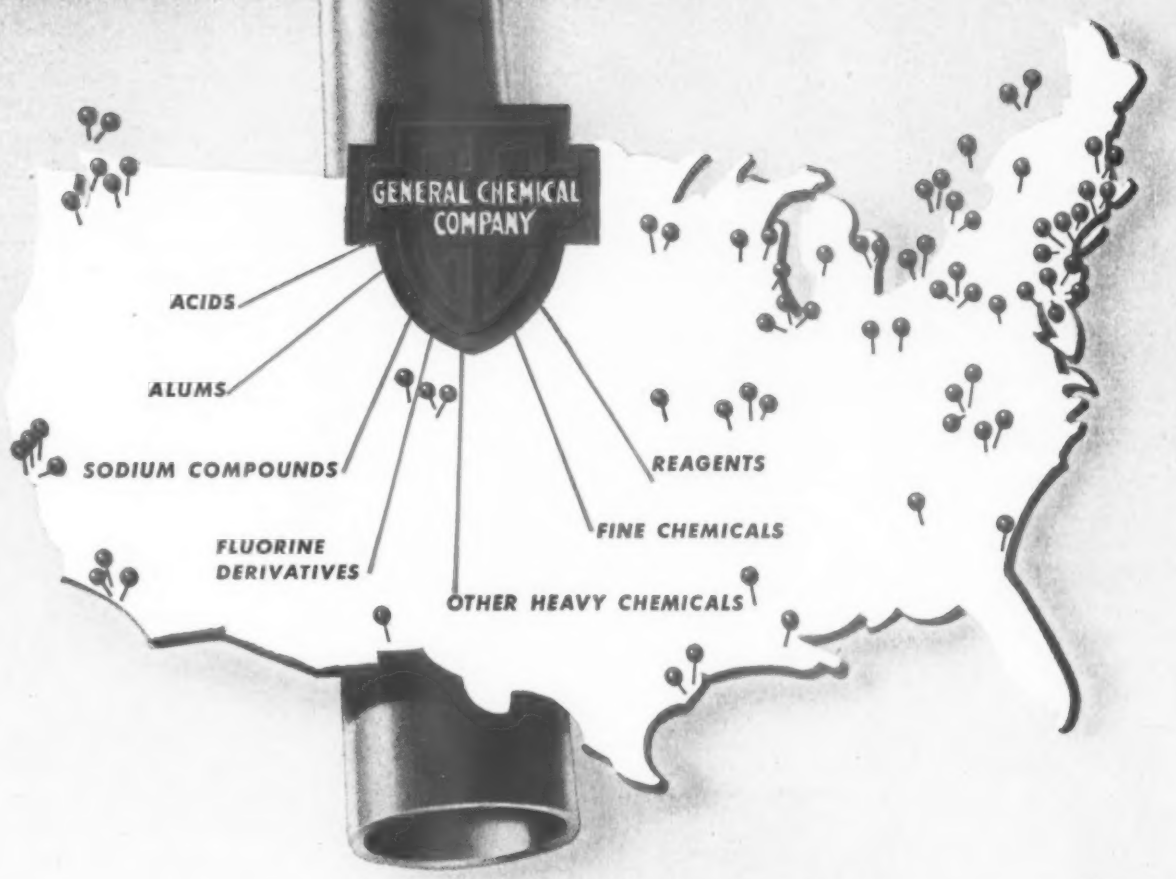

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The preformed "Head-Line" design headgear fits the natural contours of the head; is adjustable to any head size. Three types Full spark-guard (illustrated), Semi-spark-guard, No spark-guard.

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Encourages Workers to keep their Goggles Clean

Ideal for wall mounting at convenient locations throughout the shop, the M.S.A. Goggle Cleaning Cabinet makes goggle cleaning a quick, easy operation. A turn of the dial dispenses Fogpruf—effective cleaning and anti-fogging agent—cleansing tissues are pulled from an opening in the bottom of the Cabinet and disposed of in the receptacle at the side.

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MINE SAFETY APPLIANCES CO.
Braddock, Thomas and Meade Sts.
PITTSBURGH 8, PA.

(*Continued from page* 178)

cavities around the primary magnesium dendrites.

Since microporosity can be minimized but not eliminated, it is important to determine the exact affect which it produces on the strength of magnesium alloys. Due to the wide interest in the subject some tests were made[6] on Dow H and Dow C in both the as-cast and solution treated conditions. In these tests x-ray was used to determine the amount of porosity on the basis of the amount of illumination required to make the porosity just visible to the naked eye. The results of these tests are tabulated in Tables II and III.

Table II shows the variation in yield strength, tensile strength, and per cent elongation for various degrees of microporosity. Table II also compares the strength and ductility of the porous alloys with those containing no porosity.

In this table *light* porosity signifies the smallest amount which can be picked up by x-rays. *Fairly heavy* porosity indicates the maximum amount which is generally found in castings made under good foundry conditions. Commercial castings generally will contain an amount of porosity which is somewhere between the values designated as *light* and *fairly heavy* in Table II. *Very heavy* porosity indicates about the maximum amount which is ever found in magnesium alloy castings, even when made under poor foundry conditions. The strength and ductility values for those castings which are free from microporosity have been taken as typical specification values.[4]

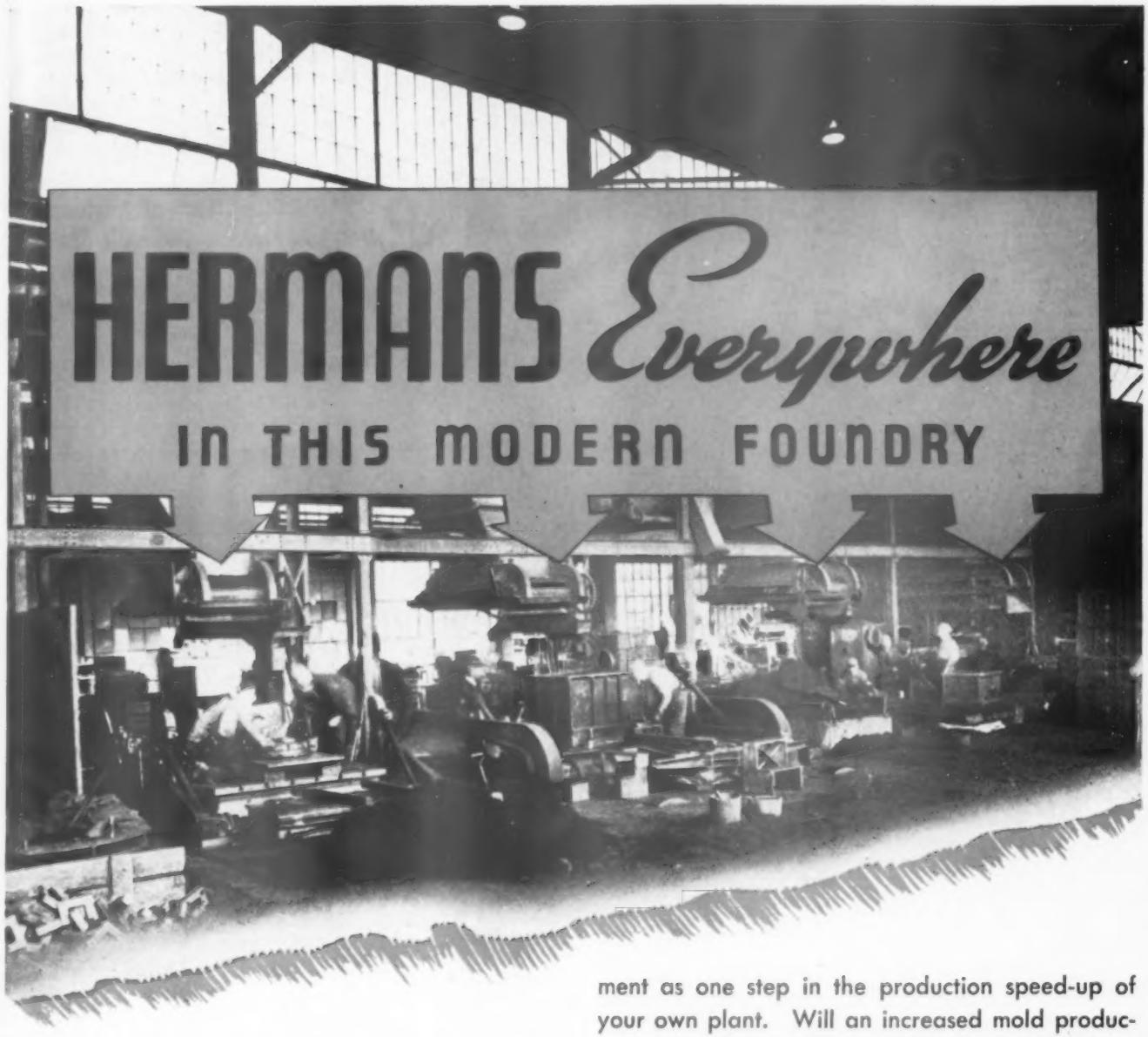
Microporosity Affects Properties

As can be seen from Table II, the tensile strength, yield strength and ductility are all decreased by increasing amounts of microporosity. This fact holds true for both alloys and for both the as-cast and solution treated conditions. However, the yield strength is affected to a much smaller degree than the tensile strength and, in fact, is comparatively unaffected except by large amounts of porosity. The small amounts of microporosity usually found in commercial magnesium castings is not enough to decrease the yield strength by any significant amount.

Since *light* porosity signifies the minimum amount which can be seen with x-ray, even this minimum represents a definite physical amount of porosity. For this reason even castings containing only *light* porosity show physical properties somewhat below typical specification values. However, these properties are still above the minimum acceptable specification values.

Table III indicates the variation in fatigue strength for various degrees of

(*Concluded on page* 182)



You, too, can fill your foundry floors with profitable low cost molds made on Herman Molding Machines. Molds are made three to four times faster than by old methods and each mold is perfect. More interesting yet, the mold cost is but a fraction of the cost of producing them by old methods. In these days of high labor costs the high-speed low-cost production made possible by the Herman is often the difference between profit and loss.

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(*Concluded from page* 180)

microporosity in solution treated Dow C. The terms used have the same meanings as already defined for Table II. The fatigue tests were made on an R. R. Moore rotating beam type machine, and were run to 100 million reversals. This number of reversals was considered to be sufficient, because the endurance limits were reached at about 50 million reversals. As can be seen from Table III, the fatigue strength, like tensile strength, is decreased by increasing amounts of porosity.

TABLE III—Effect of Microporosity on Fatigue Strength of Magnesium Alloy Castings

Alloy	Condition	Degree of Porosity*	Endurance Limit psi
Dow C	Solution Treated	None	14,000
		Light	10,000
		Fairly Heavy	7,500
		Very Heavy	5,000

*See text for definitions of terms.

One point should be remembered in considering the data of Tables II and III. The test specimens used were prepared so as to contain microporosity over the entire width of the cross section tested. If porosity was contained only in part of the area rather than over the entire area, as is usually the case in commercial castings, the strength of the casting would be increased proportionately. For example, tests on Dow C[6] indicate that if only 50 per cent of the area is porous, the tensile strength will be increased by about 500 psi over the amount indicated in Table II. If only 10 per cent of the area is porous, the tensile strength will be about 2600 psi greater than indicated in Table II. Obviously, this factor must be considered in any case where the porosity covers less than 50 per cent of the stressed area.

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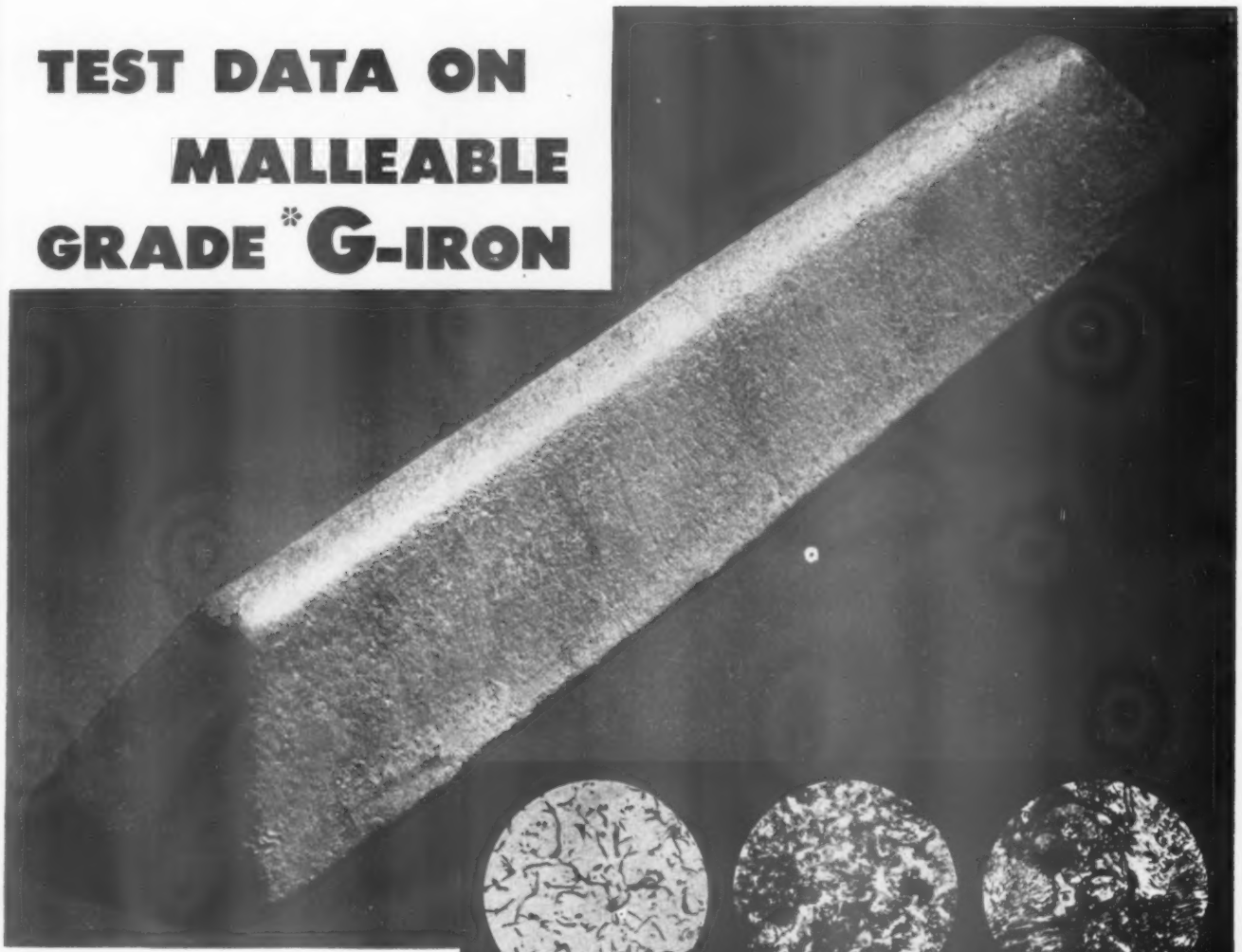
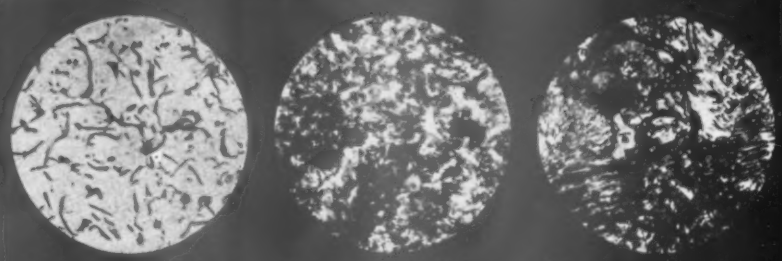
Santiam Foundry & Pattern Works, Lebanon, Oreg., has been organized by Paul and Frank Kliever and Lloyd Whitten with $25,000 capital.

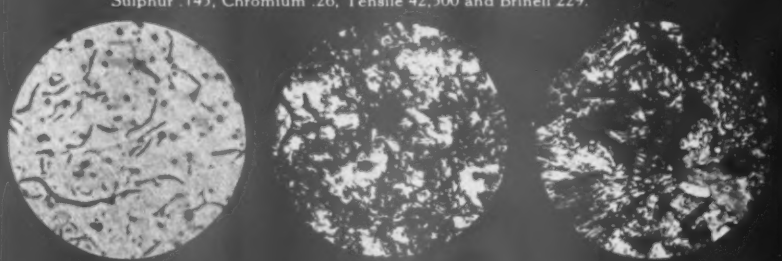
TEST DATA ON MALLEABLE GRADE *G-IRON





Photomicrograph 100 diam. unetched. Photomicrograph 100 diam. etched. Photomicrograph 500 diam. etched.

Results on above test—using 35% G-Iron pig and 25% steel scrap—are: Silicon 2.21, Total Carbon 3.31, Carbon Equivalent 4.05, Manganese .66, Sulphur .145, Chromium .26, Tensile 42,500 and Brinell 229.



Photomicrograph 100 diam. unetched. Photomicrograph 100 diam. etched. Photomicrograph 500 diam. etched.

Results on above test—using 35% G-Iron pig and 25% steel scrap—are: Silicon 2.00, Total Carbon 3.50, Carbon Equivalent 4.17, Manganese .62, Sulphur .131, Chromium .26, Tensile 38,600 and Brinell 212.

*G-IRON is graphitized pig iron. A patented blast furnace process refines the grain structure of the pig—and this refinement follows through to the finished product. The finely distributed graphite increases fluidity and reduces chill in thin sections—improves machinability and helps to overcome shrinkage and porosity between thin and heavy sections.

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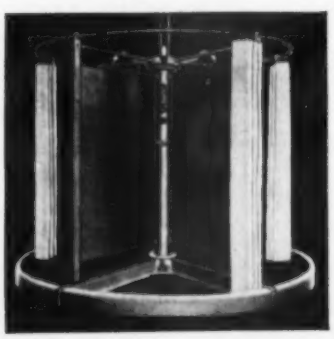

Bradley Multi-Stall Showers are a necessary addition to any modern washroom. They can be quickly installed on any kind of floor including wood. Available in 3- or 5-Stall Units, shipped partially assembled. Multi-Stall Showers conserve space, eliminate considerable piping and plumbing connections, save water and promote greater employee satisfaction through sanitary health protection.

BRADLEY multi-stall showers

TEST BARS FOR 85-5-5-5 ALLOY

(*Continued from page* 107)

a height of about 10 in. from the mold surface. Thus, a high quality melt was converted to low quality by gas absorption during the pour.

5. In general, erratic properties were obtained in the horizontal web Webbert test bar with a slow pour or pouring the metal from a height of about 10 in.

6. If the mold of the horizontal $\frac{5}{8}$-in. web Webbert test bar is tilted so that one test bar is lower than the other, the poorer tensile properties will be obtained in the lower bar.

7. The important point for the foundryman is that, if the test bars are to reflect melt quality in the pot, all of these and other foundry variables should be maintained as constant as possible so that the tensile properties of the bars obtained will depend largely upon the gas content of the melt in the pot.

Effect of Melting Practice—If the test-bar practice is standardized, eliminating as much as possible other foundry variables, the test-bar properties will be dependent on, and reflective of, melt quality. If this standardized procedure is employed, it is obvious that a rating of melt quality can be obtained by the average tensile properties produced. The reliability of this rating will be increased by the use of several test-bar designs and of several bars of each design. With such a rating, the relative merits of various melting techniques may be determined. To do this forty-nine 300-350-lb heats were made in four different furnaces, using two different charging methods. The furnaces were: (1) A 300-lb, high-frequency induction furnace lined with silica. (2) A 300-lb, high-frequency induction furnace lined with clay-graphite. (3) A gas-fired tilt furnace with a clay-graphite crucible of about 350 lb capacity. (4) A gas-fired, barrel-type rocking furnace lined with firebrick, having a total capacity of about 800 lb, but in which only 400 lb of metal was melted.

The first three of these furnaces were charged by one of the methods as follows:

1. The C_1 method consisted of melting a few pounds in the bottom of the crucible to form a heel, and thereafter adding one piece of ingot or scrap at a time until the entire charge was melted. No cover was used at any time.

2. The C_2 method of charging consisted of maintaining the crucible filled with charge at all times until the entire metal charge was melted. Again, no cover was used.

(*Continued on page* 186)

LARGE DIAMETERS

FOR *EXTRA* YEARS OF MAXIMUM

Dust recovery

Because of Buell's exclusive feature—the patented van Tongeren "shave-off"—the cyclones in Buell Dust Recovery Systems do not have to be made with small diameters in order to achieve high recovery efficiency. On the contrary, diameters of Buell cyclones can be in excess of four feet without loss in efficiency.

These large diameters make possible operation with low centrifugal force and consequent reduction in abrasive wear; and permit one-piece construction of extra-thick steel, with large duct outlets, that makes clogging virtually impossible.

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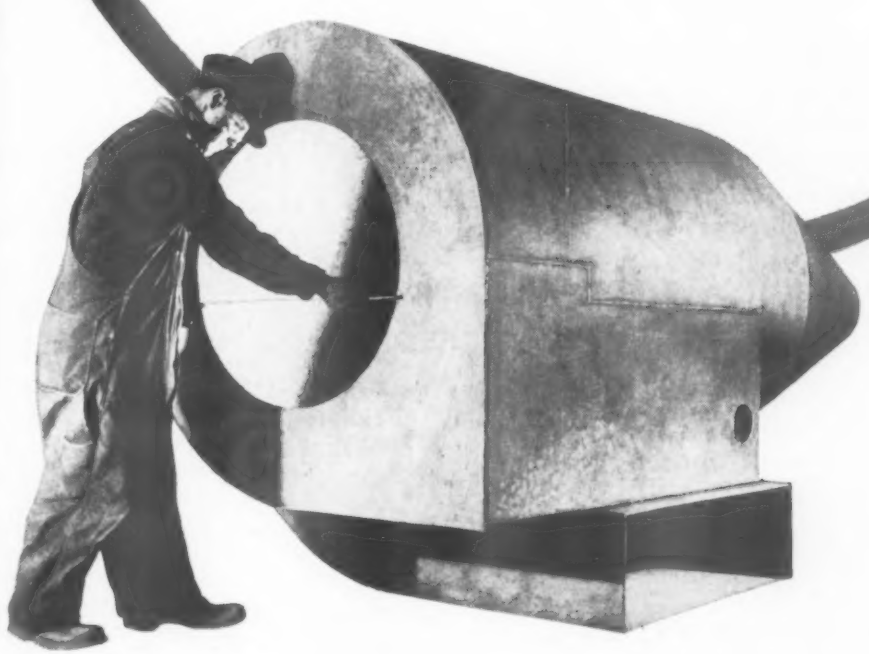

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Literally "JOLTS" Loose Tangled Metal Scrap!

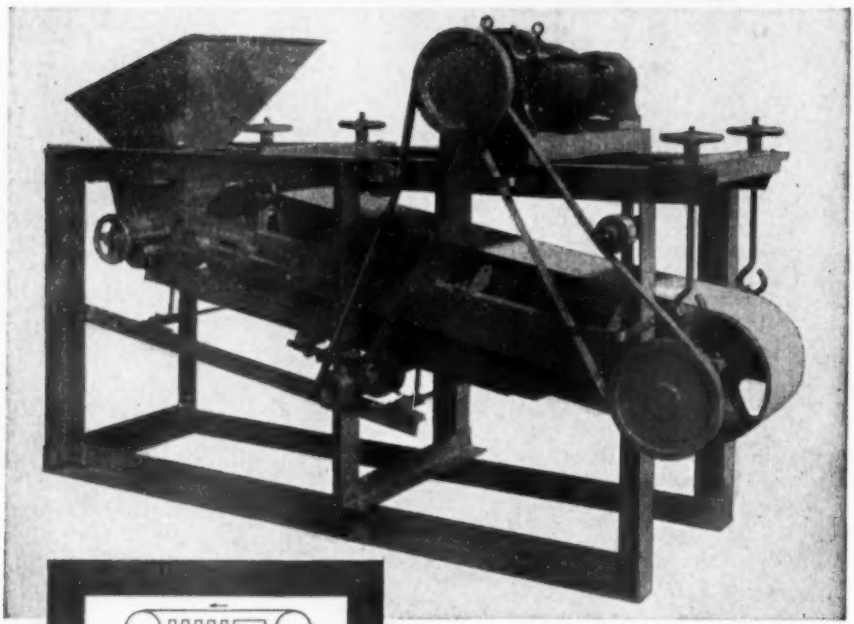

Diagram of principle of operation employed by Dings BN Separators.

Dings Magnetic Pulleys are used as head pulleys in a belt conveyor system. Bronze spacer rings, air-cooled design.

The DingsDA Separator for separating ferrous and non-ferrous scrap. Two High Intensity Magnetic Pulleys provide doubly clean separation.

Alnico horseshoe magnet used with finely divided magnetic sprinklings to inspect castings for flaws. 2½" wide x 3" high. Pole bases ¾" x ¾".

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Established 1899

Dings MAGNETIC SEPARATION HIGH INTENSITY

(*Continued from page* 184)

In all cases the melt was transferred to a pouring ladle, during which transfer zinc and phosphor copper were added to the metal stream. Five or six different designs of test bars were then poured from temperatures of approximately 2225, 2125 and 2025 F. Thus, the first three were charged in two different ways, while the fourth furnace, the barrel-type, was charged by the second method only. This set of data involved, then, seven different melting conditions, each of which was prepared by five similar heats of which two contained 5 per cent turnings, 45 per cent new ingot, and 50 per cent remelted gates and risers. The other three heats of each set had 50 per cent new ingot and 50 per cent gates and risers.

Study Relative Merits

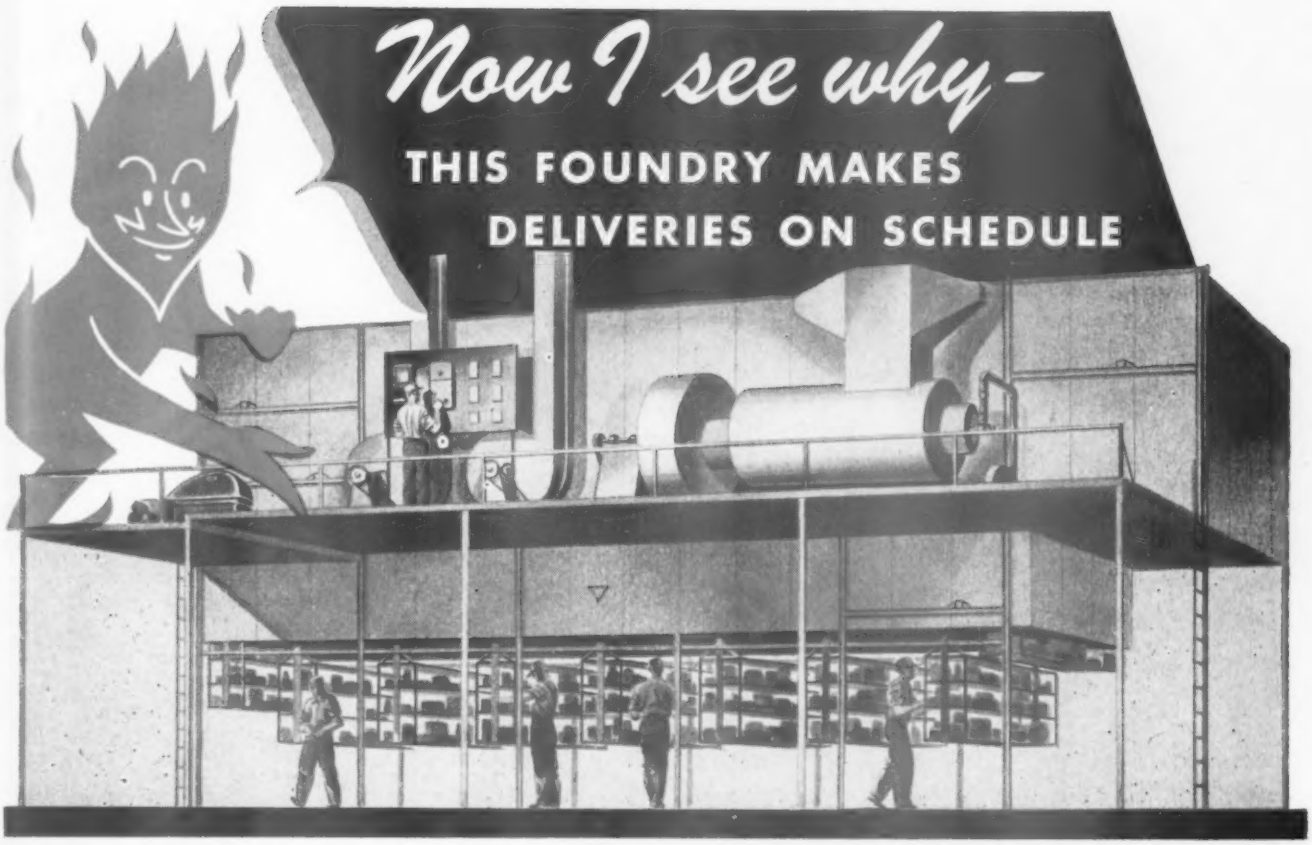
The relative merits of melting with and without a glass cover slag was also investigated by melting triplicate charges of 350-lb in the high-frequency induction furnace lined with clay-graphite, using the C_1 method of charging. The melt qualities of each melting condition are based on the weighted average tensile properties of the various designs poured at the two highest pouring temperatures. Tensile properties at the highest pouring temperature were given a weight of two, those at medium pouring temperatures a weight of one, and those obtained at the lowest pouring temperature were discarded. The results of this extensive portion of the work may be summarized by the next five figures.

1. The two sets of melts, one with machine turnings and one without, were entirely comparable and showed similar effects of the various melting techniques. Thus the conclusions drawn from the two sets of data are quite similar.

2. In general, Fig. 17 shows that, as the melt quality decreases, the elongation and tensile strength values also decrease. The abscissa on this chart shows the weighted average elongations of all designs for each individual melt, and the ordinate shows the weighted average tensile values. It is evident that, as the average elongation decreases, the average tensile strength also decreases. This makes it possible to rate melt quality readily on the basis of both average elongation and tensile values.

3. As indicated by Fig. 18, of the two methods of charging, the C_2 method is slightly superior when employing the high-frequency induction furnace lined with silica. While the tensile values are quite similar for both methods of charging, the elongation values are slightly better when the crucible is kept filled with charge as it melts down. Each

(*Continued on page* 188)



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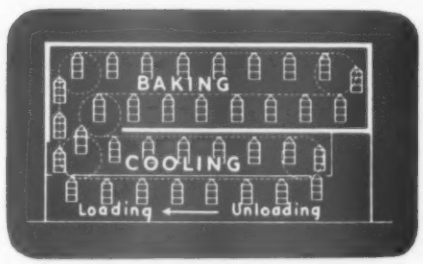

Despatch combination gas-oil fired oven, 13 feet wide, 27 feet high, 52 feet long. Has variable speed continuous conveyor. Cores make 2 horizontal passes thru bake chamber, then enter fan equipped cooling section. Cores are unloaded at lower right, then immediately reloaded.

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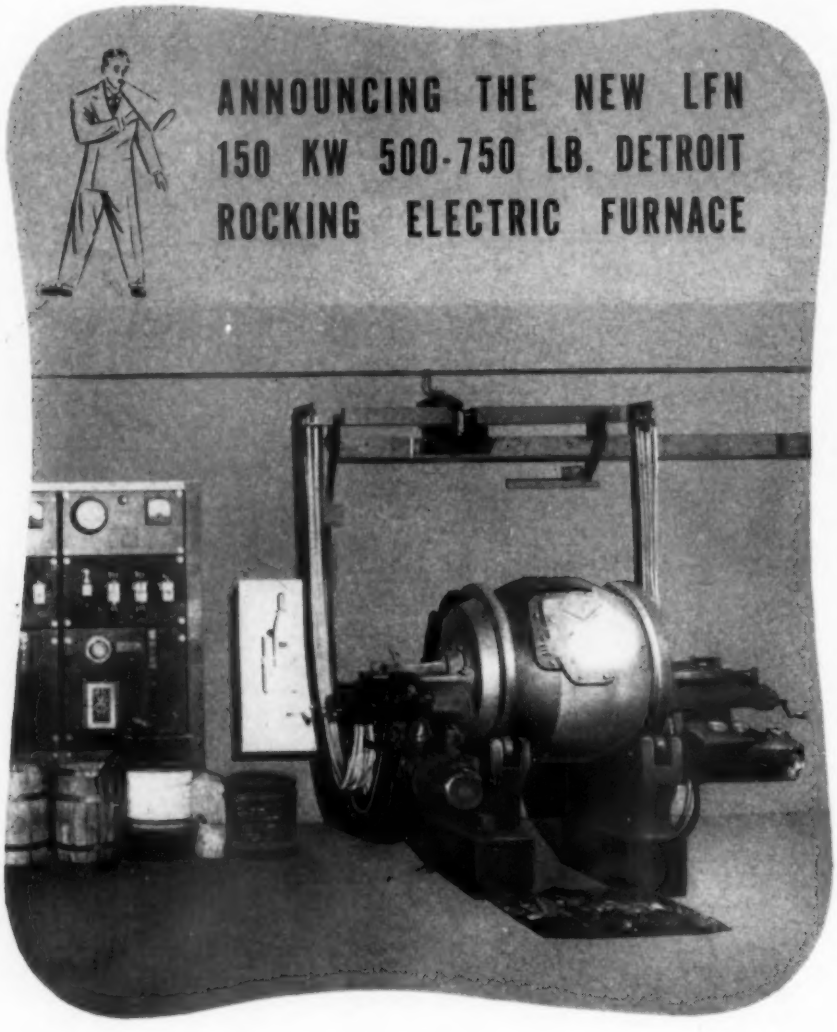

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DETROIT ELECTRIC FURNACE DIVISION
KUHLMAN ELECTRIC COMPANY • BAY CITY, MICHIGAN

(*Continued from page* 186)

point on this chart is representative of approximately 36 test bars from triplicate melts.

4. Fig. 19 shows the elongation and tensile values plotted on the ordinate and the pouring temperature plotted on the abscissa. Each point is the average of approximately 36 test bars from triplicate melts. This chart clearly indicates that the formation of a molten heel and then charging one or two pieces of metal at a time, produces higher melt quality than the other charging method when melting in the gas-fired, pot-type tilt furnace with a clay-graphite crucible. The same relationship was observed when melting in the high-frequency induction furnace lined with clay-graphite. The improvement obtained by the C_1 method of charging is probably caused by the greater opportunity for oxidation; thus, offsetting the adverse effects of the contact of the melt with the carbon in the crucible. A similar relationship was found with the high-frequency induction furnace, using a clay-graphite lining. Thus, in general, when melting in contact with clay-graphite, the C_1 method of charging is the better.

Rate Melting Units

5. Combining the data obtained by both methods of charging, the four different furnaces investigated were rated according to the decreasing melt quality produced: (1) The high-frequency induction furnace lined with silica. (2) The gas-fired rotary furnace lined with firebrick. (3) The high-frequency induction furnace lined with clay-graphite. (4) The gas-fired tilt furnace using a clay-graphite crucible. This is illustrated by Fig. 20 which shows the relationship of tensile properties versus pouring temperature of the melts from the four different furnaces. The data obtained at the two highest pouring temperatures at which the effect of melt quality is the most pronounced are the significant ones. Each point is the average of approximately 72 test bars from triplicate melts. Data on the rotary, gas-fired furnace, however, is the average of 36 test bars per point. During the preparation of these melts, the gas-fired furnaces were operated to produce 0.5 per cent oxygen in the flue gas. No cover was used when melting in the high-frequency or gas-fired pot furnace. Furthermore, after the metal was melted, it was skimmed to remove the accumulated dross and permit good contact with air; thus, accentuating the oxidizing condition. A glass slag cover was used in the barrel-type furnace, but the rocking action necessarily promotes oxidation of the melt.

6. The importance of the exposure of the melt to oxidation is shown by Fig.

21, illustrating tensile properties versus pouring temperature of triplicate heats made in a high-frequency induction furnace lined with clay-graphite. Each point is the average of approximately 36 test bars. One set of melts was made under a glass slag and the other by exposing the melt to oxidation, as described previously. The enormous superiority of the melt prepared under oxidizing conditions is evident. The exposure of the melt to oxidizing conditions doubtless produces a high oxygen content in solution in the melt, which in turn permits only a very small concentration of the gases, such as hydrogen or possibly the gas former, carbon. The oxide or oxygen dissolved in the melt is then reduced with phosphorus, with the final result that the oxygen and gas or gas former are both very low when the melt is poured into the mold cavity, resulting in sound castings and high tensile properties.

Selecting Proper Test-Bar Design—An important goal is the selection of a test-bar design which will most accurately reflect the melt quality, employing a standardized test-bar practice. It has been previously indicated that the melt quality produced in any one heat could be fairly accurately rated by employing the average tensile properties of all the test bars of the various designs poured at the two highest temperatures. Thus, the melt-quality ratings would be based upon either 20 or 25 test bars of five or six different designs. The 49 different melts, previously described, were rated in this manner. By this method, the numerical average elongation value was adopted as a measure of the relative melt quality. This makes it possible to plot melt quality versus the individual test-bar values or the average of two bars cut from the same castings for each individual design. If a considerable scatter results, it indicates that the design under consideration did not have a very close correlation with melt quality.

This was done for all of the designs of test bars, and it was concluded that a close correlation between melt quality and the average test-bar values of the two bars cut from the same castings of five designs was rather poor. These five designs which do not accurately reflect melt quality are: (1) Navy ⅝-in. web Webbert (2) Navy ⅝-in. Crown (3) Canadian Universal (4) Modified Crown (5) Modified web Webbert.

On the other hand, the following three test-bar designs were found to have a fair correlation of melt quality with the average tensile properties of the two bars out from the same castings: (1) Navy 5/16-in. web Webbert. (2) Horizontal ⅝-in. web Webbert. (3) L.T.B. Of these three designs, the L.T.B. is probably the

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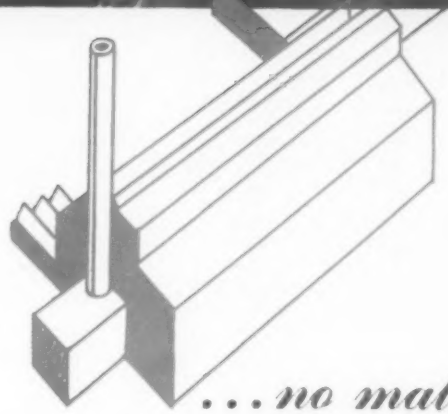

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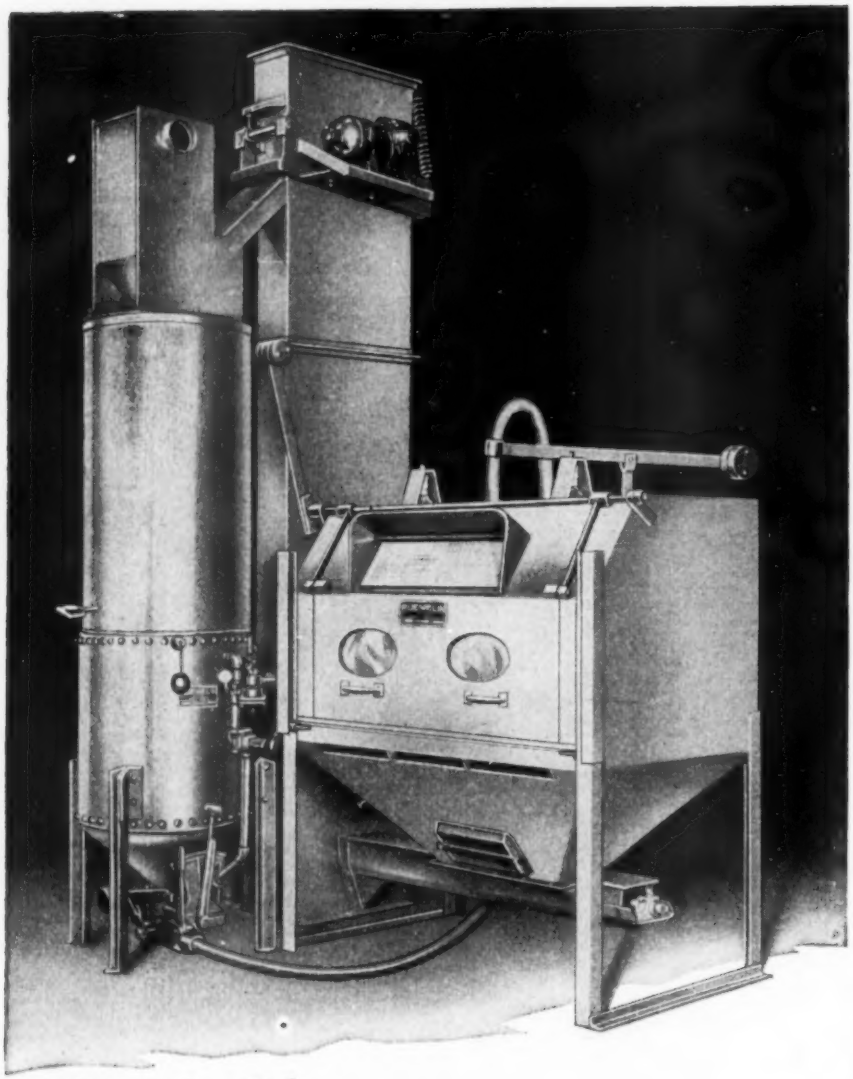

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most questionable because the rapid directional solidification toward the center tends to eliminate the effects of the gas content of the melt. This objection has also been noted by the British on similar designs. Furthermore, this design tends to produce centerline shrinkage, a defect dependent upon the design and independent of melt quality. This defect, however, has a very adverse effect on test-bar properties. Fig. 22 shows, on the vertical axis, the average tensile properties of two horizontal ⅝-in. web Webbert test bars machined from the same casting poured at a temperature of about 2235 F. The horizontal axis shows decreasing melt quality of the metal employed. There is fair correlation but a considerable scatter occurs in the test-bar properties of a given melt quality in the intermediate range.

Fig. 23 shows a similar relationship for the Navy 5/16-in. web Webbert. Not quite so many data are available on this design, but those which are available indicate a rather good correlation between melt quality and the average properties of two bars cast together. The minimum elongation and tensile values, required by existing specifications, are indicated. Fig. 23 is similar to Fig. 24, except that individual test-bar values are plotted on the vertical axis of the latter. While the same trend, as noted before, is evident, there is, however, a considerable spread indicating that individual test-bar values are somewhat unreliable for accepting or rejecting heats.

This matter of correlation of the test-bar properties with the melt is a very important one because on it hinges the entire value of our test-bar procedures. Even with the best test-bar control of which we are now capable, there is not a precise but rather a general correlation of test-bar properties with melt quality. If we used individual test-bar values, the scatter becomes even more severe. The correlation will become even less close if variations are permitted to occur in our test-bar practice, thereby adding these variables to those which are more difficult to control.

By way of standardizing test-bar practices, the melt quality will be most accurately reflected by the test-bar properties obtained in 85-5-5-5 alloy if:

1. A specific test-bar design is selected. On the basis of existing information, the Navy 5/16-in. web Webbert or the horizontal ⅝-in. web Webbert appears the most suitable.

2. The gate dimension, sprue size, and method of making the pattern is fixed to avoid variations in these factors.

3. The mold is horizontal to prevent variations in the flow of the metal into the mold cavity.

(*concluded on page 222*)

BRINELL HARDNESS OF GRAY CAST IRON

(*Continued from page* 93)

bars may be due to the smaller span/depth ratio of the 3-in.

The data on the different sizes may be summed up in the statistics shown in Table III, which gives the best straight line, the standard error, and the correlation coefficient for each size using the individual results and for the average of all sizes using only the average transverse results for each tensile class.

The data from the impact report are also included in the table. It should be remembered that the bars in the *Impact Report* were machined down from 1.4 to 1.20-in. diameter.

Brinell and Stiffness—The next relationship of interest was that of hardness and stiffness. Since few data on deflection were available, except at the breaking point, it seemed that the impact tests alone would furnish a reasonably good approximation. Figs. 8 and 9 show this data (which includes the two which are not really gray irons, *X* and *N*). The correlation is very good and the error small. If *X* and *N* were omitted the agreement would be much better but since as-cast bars could not be expected to be nearly as consistent as these machined bars, they were left in for the present purpose.

Brinell and Impact—Since it has been shown that the resistance to shock is a function of the resilience, i.e. the area below the stress-strain curve, it seemed probable that the tensile-brinell ratio would also be an index of the toughness. The simple ratio tens/bhn was tried on the *Impact Report* data with fairly good results but it seemed more likely that some higher power of the tensile would be more logical. The ordinary formula for transverse resistance Mr^3/E suggested the $tens^2/bhn$ but this seemed to overemphasize strength as compared with stiffness and neglects the increased curvature of the stress strain curve in the softer irons. An intermediate of $tens^3/bhn^3$ was therefore invesigated and proved slightly better, as shown in Table IV, but all of them showed fairly good correlation with both the drop test and the pendulum, though as would be expected, the drop test correlates better since it is nearer to the triangular resilience than the pendulum test. The results are plotted in Fig. 10 and 11.

Drop test results from one foundry were available for 59 *B* bars and 54 *C* bars, which were analyzed with the results shown in Table V. These data compare very poorly with the results from the *Impact Report*, but the bars

(*Concluded on page* 194)

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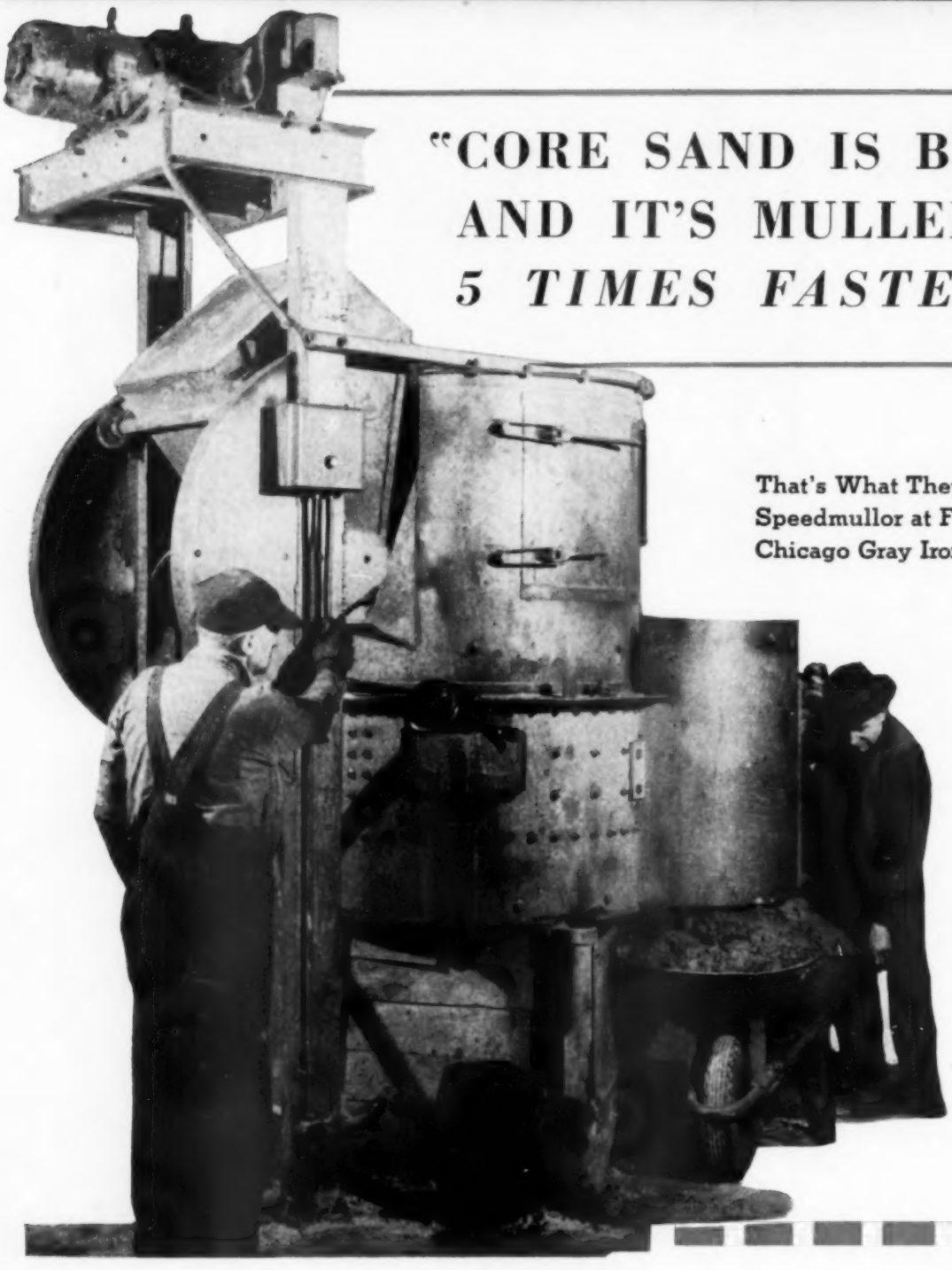

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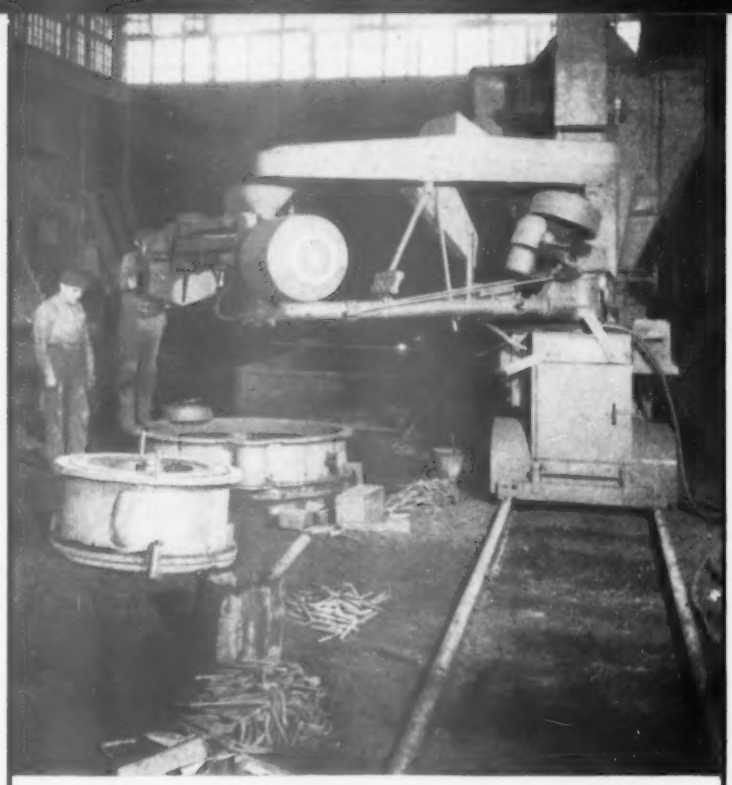

Ferguson & Lange's Motive Jr. Sandslinger does 90% of the foundry's ramming. It has increased mold production more than two-thirds. The "Slinger" travels up and down a 3-ft. gauge track under its own power, ramming molds on both sides, within the radius of its long arm.

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SPEEDMULLORS, SCREENARATORS, MULBAROS, SHAKEOUTS, SAND CONDITIONING MACHINES, GYRATORY SCREENS

(*Concluded from page* 191)

were not machined, so the condition of the surface is a highly important factor in the drop test but does not affect the tensile or brinell at all. In both sets the tens²/bhn is a better correlation than the other ratios. The large differences in the standard errors are due to the differences in the range of value in these ratios. These were as follows:

	Bar B	Bar C
tens/bhn	120-240	100-185
tens²/bhn	25-140	20-100
tens³/bhn²	25-220	20-180

The height of drop varied from 5 to 15 in. on the *B* bars and from 8 to 20 on the *C* bars. (The units previously given are actually correct only for the tens/bhn. Tens²/bhn are X 10^{-5} and tens³/bhn² are X 10^{-7}).

The charts for tens³/bhn² are shown in Figs. 19 and 20. Assuming that this is the best ratio when the same metal is being tested (as in the *Impact Report*) then the correlation coefficients show that the drop test is affected by other factors than the tensile strength and brinell hardness of the metal some ¼ to ½-in. under the skin. The extent of this is statistically the difference between unity and the square of the correlation coefficient in the case of the 1.20-in. bars: [1 − 0.4^2 = 0.84], and for the 2-in. bars [1 − 0.6^2 = 0.64].

Tensile Strength and Toughness

In spite of the rather unsatisfactory results of this study on impact it is quite clear that with a given tensile strength we may expect more toughness from the lower hardness numbers, or to revert to Fig. 1, the tough irons are on the left of the Field. No ni-resist irons were included except in Fig. 3 (iron *X*) but some half dozen sets ranging from 18,000 to 30,000 psi tensile strength were checked and are all outside of and to the left of the Field and they are all very tough.

One reason for the scatter of the tensile-hardness data is that there was no uniformity in the place the readings were taken. Some ground a flat on the side of the transverse bar, some read half-way between edge and center on the ground end at the fracture; one took readings at center, half-way, and edge and averaged these, while several used the tensile specimen after fracture—grinding off the threads for a flat sufficient for the impression. Since these were in the majority and it is perhaps the simplest and easiest method, the author would suggest to ASTM Committee A-3 that this method be standardized.

El Monte Brass & Aluminum Foundry, 600 Gaebe Rd., El Monte, Calif., has been started by Ramona F. Hernandez, Manuel Baltierra, Raymond Juarez and Frank Ramirez.

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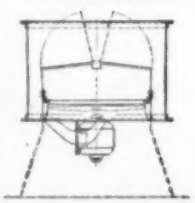

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NAVY YARD REVAMPS FOUNDRY

(*Continued from page* 115)

lb; coke 150 lb, approximate 3 in. size; limestone 20 lb between splits. Ladle addition SMZ 75-7-7, 3 lb per 1000 lb metal. Chemical composition as shown in table. Physical properties in standard arbitration test bar, 1.20 in. in diam, 18 in. between centers: Tensile strength, minimum required 24,000 psi, minimum obtained 30,000 psi; transverse strength 2600 lb; deflection 0.24 in.; bhn 200-225. This metal also is suitable for class *A*, *B*, *C* of N. D. Spec. 46-1-6c.

"Risers and gates of all castings made from this composition are identified by a short piece of thin steel strip inserted in the top of the sprue immediately after the casting is poured and while the metal is still liquid. The strip is stamped with the figure 1. Similar strips with suitable figures are inserted in the sprues of castings made from other compositions, whether ferrous or nonferrous. The practice facilitates the work of the men who collect the scrap and allocate it to the proper bin or other container."

Equipment Added

The modernization program added a new melting room, four furnaces, sand distributing system, ladle heaters, roller conveyors and a monorail system for distribution of the molten metal in the nonferrous department of the foundry located in the east side bay. Metal is melted in a battery of ten furnaces fired with propane gas. The battery includes four tilting type furnaces with capacity of 1200 lb each, four similar type furnaces with capacity of 750 lb each, and two furnaces equipped with No. 150 crucibles, holding approximately 400 lb each of bronze and one third that amount of aluminum. A close-fitting sheet metal hood over each furnace and connected to an exhaust system collects and removes all smoke, gas and dust produced in the vicinity while the furnace is in operation.

Molding machines in the steel foundry are separated from those in the nonferrous foundry by the row of steel columns supporting the crane runways and roof of the building. A long conveyor belt delivers sand to the hoppers over the steel molding machines on one side of the columns. A similar and parallel belt on the opposite side of the columns delivers sand to the hoppers over the machines in the nonferrous department of the foundry. Molds from the machines are placed on roller conveyors extending from the machine line to a wide gangway on the opposite side of the bay. A constant supply of metal from the fur-

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naces is distributed in a manner to prevent crowding or congestion on the conveyor lines.

A transfer car, traveling back and forth on a track at the end of the conveyor lines, takes the filled molds to a shakeout station where the sand falls through a grating onto a belt under the floor, and by belt and elevator eventually reaches the large storage bin from which it is taken later in measured batches and prepared for use in one of the four muller type sand mixing units. Castings are loaded in tote boxes or on a roller conveyor and taken into the cleaning department. The empty flasks, jackets, bands and bottom boards are placed on a second conveyor, which carries them back to the molding stations.

A brick wall separates the nonferrous melting room from the outside area. An opening at each end and one in the center permit passage of the ladles suspended from a monorail extending from the front of the furnaces to the various pouring stations on the mold conveyor lines. The service is supplemented by two bridge cranes which range over the entire area. The cranes also are available for lifting molds, or any other form of load beyond manual capacity.

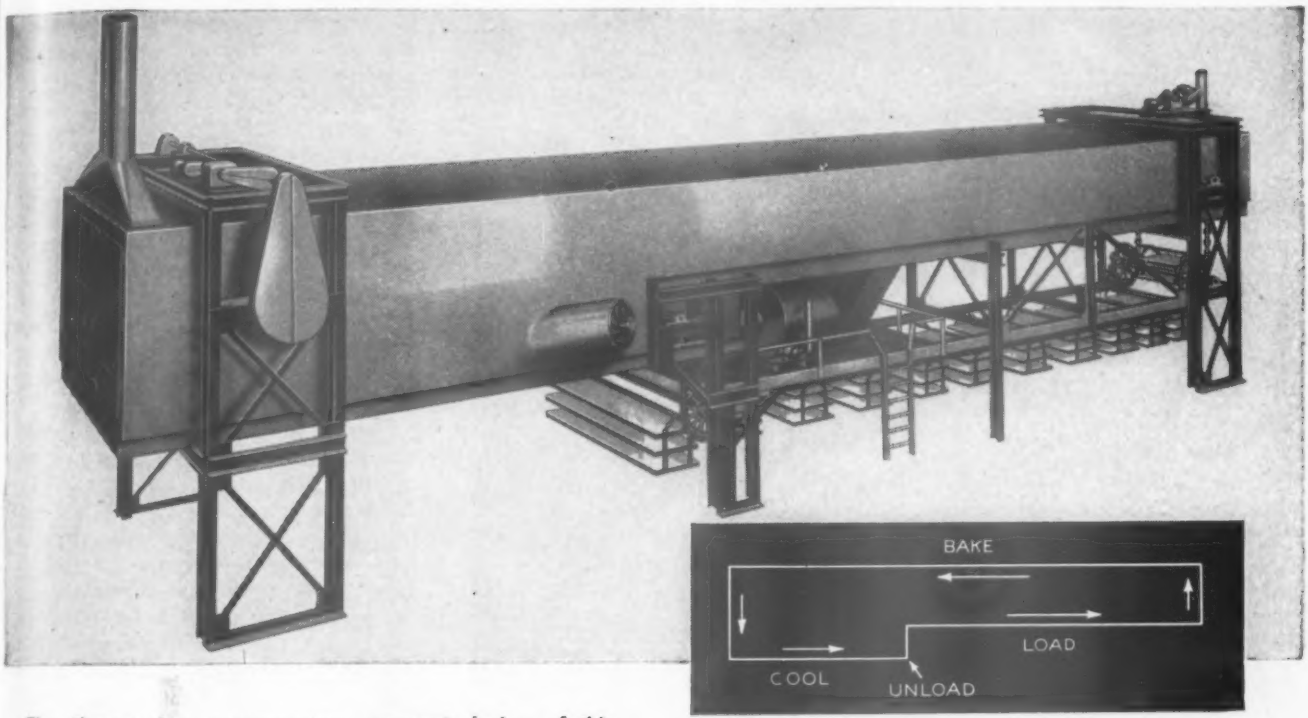
Furnace Operation

Method of operating propane gas fired crucible furnace is presented in definite detail in *Standard Practice* book:

"Remove top cover to one side and inspect interior of furnace for obstructions that may prevent proper flame distribution around crucible. Close blast gate in air line. Start combustion air blower. Open hand operated main gas valve slowly. Insert piece of kerosene-soaked waste through drain hole and light waste. Open the gas cock slowly to wide open position. Gas cock must be in either closed or wide open position. Desired temperature can be secured by adjusting blast gate valve in air line. Replace top cover on furnace. Heat the crucible slowly to a red heat. Metal never should be charged in a cold furnace. Charge solid materials, to the top, but not above the top of the crucible. Use hand tongs to prevent dropping heavy pieces in crucible. Ingots may be preheated on the furnace cover.

"Metals tend to absorb gases and oxidize upon heating. These features increase with time and temperature with greatest increase at the metal melting point. Metal should be melted as rapidly as possible, and should not be held any longer than necessary after the desired temperature is reached. Burners should be kept going at minimum speed while pouring metal from the crucible into the pouring ladle. The crucible

(*Continued on page* 198)



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This new core oven can be installed in practically any building without making any major structural changes.

The coremakers are located right next to the oven so that they can load the cores directly on the moving racks thus eliminating the necessity of transporting them on hand trucks or a conveyor from the core room. The location of the coremakers, at the oven, also saves core room space.

The size of the loading racks can be varied and the shelves can be adjusted to accommodate cores of many sizes and shapes.

Besides allowing for the removal of exhaust gases at the point of greatest concentration, the new oven design provides an effective cooling zone for the cores and assures comfortable working conditions for the coremakers.

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BRASS • ALUMINUM • MAGNESIUM
AND ALL OTHER
NON-FERROUS ALLOYS
The Campbell-Hausfeld Co.
300-320 MOORE ST. HARRISON, OHIO

(*Continued from page* 196)

should be well cleaned and preheated to a red heat each time before it is charged. In aluminum melting the crucible should be scraped after each heat to prevent oxide build-up.

"At the close of the day's operation set blast gate valve to minimum position in air line. Close hand operated main gas valve, then the gas cock before zero governor. Allow combustion air blower to run until furnace reaches a dull red heat. Then shut down blower. In an emergency or when in doubt, always close the gas valve first.

"List of what not to do is as important as the list of what to do. Do not seal silicon carbide cover to furnace top. Do not seal the spout opening. Do not mud up the drain hole. Do not wedge or drop ingots during charging. Do not allow ingots to project above crucible. Do not leave metal to cool in crucible. Do not drop large pieces of cold metal into crucible containing molten metal. Unless first heated it will chill back. Do not use charcoal. Do not use 100 per cent scrap metal for pressure castings. Do not keep metal in furnace over lunch hour, or at any other time after it has reached proper temperature. Do not use painted scrap. Do not let metal heat and boil due to late additions of solid charge. Furnace should be cleaned from the top when necessary, and not by inserting pokers through the drain hole.

Melting Gun Metal

"With the necessary changes in composition, the melting technique for the various bronzes is fairly uniform. A typical example is presented in Gun Metal, Comp. G. Other specifications include N. D. Spec. 46 M 6h and Fed. Spec. QQ-B-691a, Gr. 5. Physical properties include 40,000 lb psi tensile strength and elongation 20.00 per cent.

"The crucible charge for gun metal may be either *A*—new ingot, or *B*—50-50 ingot and remelt. Furnace and crucible are raised to a temperature between 1600 and 2200 F prior to charging. Crucibles in which silicon or aluminum bearing alloys have been melted should not be used. Stirrers, skimmers, poking rods, phosphorizers which have been used in melting silicon or aluminum alloys should not be used.

"Preheated ingot is charged through hole in the cover immediately after first charge has melted down. Remelt material or backstock should be clean with no pieces over 4½ in., square or 6 in. in diam, by 14 in. in length. A temperature reading after metal is melted should not exceed 2250 F. The surface of the metal is skimmed and 1½ oz phosphor-copper per 100 lb of metal is added by

(*Continued on page* 200)

Gehnrich CORE • MOLD Ovens

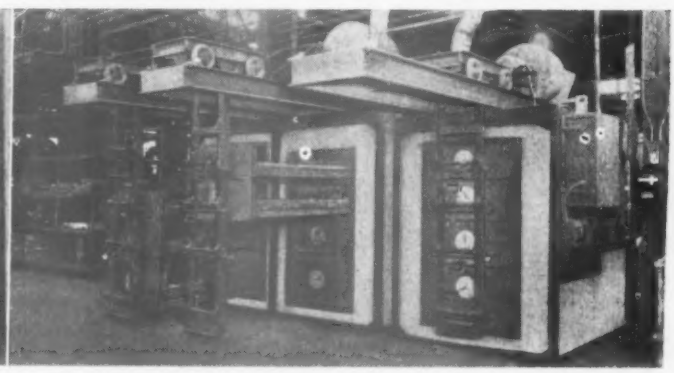
MEET THE SPECIAL REQUIREMENTS OF AN OUTSTANDING PLANT

In one of the largest foundries in America there are a great number of Gehnrich Core and Mold Ovens of all types selected for their engineering superiority, and operated with economy and efficiency.

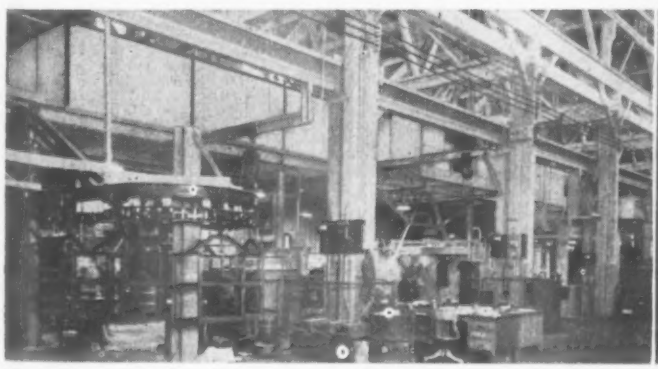
As shown here, these ovens range from shelf, drawer or truck loading types to larger car or monorail conveyor types. They are electric, oil or gas heated, employing internal or external heating systems, as required. All of them are equipped with Gehnrich recirculating convection systems which provide the heating uniformity and drying speed so necessary in better core and mold production.

The continued confidence of this long time Gehnrich Oven user, duplicated in hundreds of other cases, well merits yours as well. Let us tell you why.

Continuous four-pass monorail conveyor core oven, 125 ft. long, mounted high above floor level; electric recirculation heated.



Two of 4 large mold ovens, each handling 100-ton load, heated by external oil-fired air recirculation systems.



Tunnel type, intermittent, monorail conveyor core and mold oven with cross flow heat recirculation.

Four pull-drawer, electric core ovens with cross-flow recirculation systems.

Write for the Gehnrich Foundry Book

GEHNRICH OVEN DIVISION

Ovens and Furnaces for Core Baking • Heat Treating • Finishing

W. S. ROCKWELL COMPANY • 210 ELIOT STREET, FAIRFIELD, CONN.

OTTAWA SILICA CO. *offers . . .*

WASHED
DRIED
SCREENED
GRADED
WHITE SANDS

Our specially prepared SILICA SANDS are available in various sizes. We have the particular grade best suited for your requirements. ¶ You will find our SANDS most suitable for cores —they save oil—they are clean, uniform and constant in quality. ¶ SILICA FLOUR, at its best, for foundry uses.

OTTAWA SILICA COMPANY
Ottawa, Illinois

(*Continued from page* 198)

phosphodizer. When using the 50-50, or *B* charge, ¼ lb zinc is added per 100 lb of metal in the ladle. Within 5 minutes after temperature reading, the metal from the furnace is poured into a ladle preheated to 1600 F and with 1 oz phosphor-copper per 100 lb metal wrapped in lead foil in the bottom. Unless special conditions must be taken into consideration, castings with section ¼ in. or less are poured at a temperature between 2235 and 2250 F. Metal for castings ¼ to ¾ in. thick in cross-section is poured at a temperature of 2125 to 2200 F. Temperature of metal poured into castings over ¾ in. thick ranges from 2050 to 2125 F."

In addition to serving a utilitarian purpose in supplying castings of almost infinite variety, the foundry of the Naval Shipyard, Portsmouth, Va., has served as an experimental laboratory for the solution of many usual and unusual problems. As might be expected, the subject of gates and risers and the part they play in the successful production of castings occupied a prominent place in the general program. The technique in complete and intimate detail was described in a paper prepared by S. W. Brinson, Master Molder, and J. A. Duma, metallurgist, presented at the AFA 44th annual convention in Chicago, May 10, 1940, and later incorporated in the *Transactions* of the association, Vol. 48, pp 225-282.

Technique Is Successful

Success of the technique has been achieved by (1) the use of miniature models for a critical study; (2) insistence on the application of the principles governing directional solidification; (3) relieving molds and cores mechanically after pouring; (4) use of synthetically bonded sand mixtures; (5) high quality steel; (6) constant and wide spread use of gamma-ray examination of the internal structure of all critical sections.

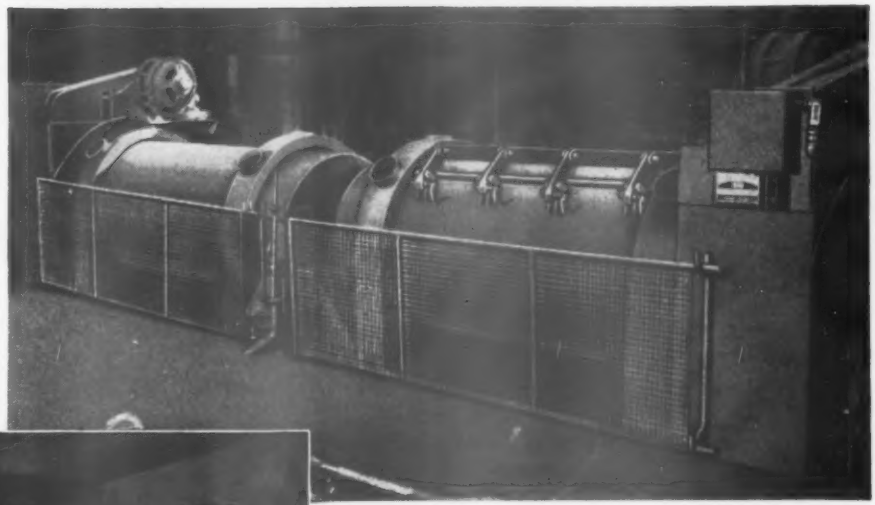
At the recent Cleveland convention the same authors, in discussing the subject of knockoff risers on nonferrous castings, drew several interesting conclusions. Comparing the relative efficiency of knock-off risers in ferrous and nonferrous divisions, the authors claimed that a greater number of sound castings, also easier knock-off, are obtained with nonferrous castings. Perforated metal screens and graphitic carbon disks effect distinct economies in cleaning brass and bronze castings. Perforated screens function best in risers not larger than 5 in. in diam. Carbon disks function in all risers. For the same amount of feeding, gypsum sleeves enable the use of risers approximately 30 per cent smaller than the usual

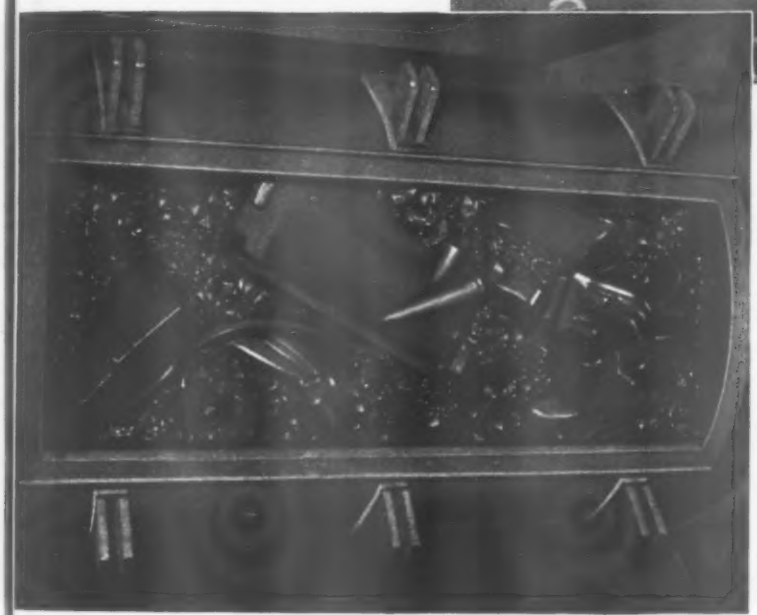
(*Concluded on page* 202)

RANSOHOFF AUTOMATIC STAR-RETURN WET CLEANING MILLS

WET CLEANING... THE RANSOHOFF WAY . . . . . .

THE SHORT CUT TO LOWEST CLEANING COSTS





YOU SAVE ON MAINTENANCE
• • •
YOU SAVE ON OPERATING COSTS
• • •
YOU SAVE FROM 30% TO 70%

THE cost factor still looms as persistent as ever in foundries. *Costs must be cut* for economical production. Modern equipment plus modern methods can make the difference between loss and profit in your foundry. RANSOHOFF WET CLEANING MILLS usually prove the turning point in saving time, labor and maintenance in your cleaning room . . . as is shown by cost records in practically every installation.

A bird's-eye view of the RANSOHOFF CLEANING MILL shows castings buried in a mass with stars intermingled without voids, stars entering and returning automatically, easy, gentle, economical cleaning. You'll see castings being cleaned without nicking or breaking . . . and in addition, you'll find that mills are not self-destructive.

Photograph shows an installation which DOES THE WORK IN ONE-FOURTH THE TIME formerly needed.

SEND US A SAMPLE BATCH. We will send you a complete report without obligation on your part.

MEMBER
FOUNDRY EQUIPMENT

N. Ransohoff, Inc.

Township and Big 4 RR CINCINNATI 16, OHIO

ATTENTION: FOUNDRYMEN!

"VICTOR" FERROPHOSPHORUS can now be obtained for prompt shipment either in carloads or LCL.

"VICTOR" FERROPHOSPHORUS contains 22% to 25% Phosphorus and is an economical and sure method of increasing Phosphorus content of your metal.

"VICTOR" FERROPHOSPHORUS is produced in standard lump or 2" x 3" for all melting purposes. For ladle additions it is sized either 3/8" x 1/8" or 1/8" and down.

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(INCORPORATED)
CHICAGO · DETROIT · CINCINNATI · ST. LOUIS · NEW YORK
CLEVELAND · PHILADELPHIA · PITTSBURGH · INDIANAPOLIS

(*Concluded from page* 200)

type sand enclosed riser.

While on this subject, and in conclusion, it may be interesting to mention a bell casting shown in an accompanying illustration. These ship bells have been made in a wide variety of sizes and weights from 25 to 1000 lb in bell metal before the war, in stainless steel during the war and, finally, in silicon bronze. All bells were molded in the usual manner, mouth down, and all castings were satisfactory with the exception of the castings in the 300-lb class. All the usual expedients suggested by practical experience failed to produce a perfectly solid casting. Finally the bell was molded upside down and gated at the top on the outside through a circular runner and a number of small ingates. In defiance of all tradition, three risers were set up on the sloping surface inside the skirt. This bell passed every test except a complete and satisfactory explanation.

The incident might furnish a topic of discussion at a chapter meeting under the title *The Perversity of Inanimate Objects.*

PATTERN RECORDS

(*Continued from page* 87)

engineering department. Patterns can be repaired or new ones made during slack times in the pattern shop.

10. Pattern made by (name). This helps to establish the reputation of a pattern shop or skill rating of a patternmaker, both helpful to know, but not of paramount importance.

11. Actual cost (act. cost) or estimated value (est. v.) Important to know when a new or like pattern must be made or estimated on.

12. Casting material: Iron (I); brass or bronze (Br); malleable iron (M I). cast steel (C S); aluminum (Al), etc.

13. Heat treatment.

14. Bill of lading number. Bill of lading or pattern receipts are kept on file in some pattern storage buildings, either in original form or carbon copy —one copy for patterns sent and signed for, and one copy for patterns picked up or received.

15. Purchase order number. This is needed at times for tracing purposes.

In defense of a listing of the foregoing information it may be said first, a history of the pattern is often necessary; second, all pertinent pattern information should be centralized, the logical place for this purpose being the pattern vault.

Pattern Identification: A numbering system or means of pattern identification should be so devised that it best serves

(*Continued on page* 204)

PRODUCTION CUT COSTS

with CP PNEUMATIC TOOLS

For foundry needs, Chicago Pneumatic offers a complete line of pneumatic tools notable for simplicity of design, ruggedness of construction, high operating efficiency and low maintenance.

CP CHIPPING HAMMERS FOR EVERY FOUNDRY NEED

CP Ring Valve Chippers are ruggedly built for heavy duty work; with simple valve construction and low maintenance.

CP Simplate Chippers are of simple design, with plate type valve, giving an exceedingly smooth action and fine throttle control.

Both types of these CP Chipping Hammers are available in a range of sizes to meet every foundry need.

FOR FAST, ACCURATE AND ECONOMICAL GRINDING

For foundry operations, Chicago Pneumatic furnishes a line of pneumatic grinders of rugged construction, designed to operate at the speeds best suited for various types of service. Equipped with either pistol grip or straight handles.

BETTER SAND RAMMING AT LOWER COST

Because of the accuracy with which the rammer blow can be controlled, CP Sand Rammers give maximum efficiency and economy in operation. Floor and bench models are furnished in sizes to meet every requirement; also available with lubricator.

Write for a copy of Catalog 564

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PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

HOW ARE YOU FIXED FOR EXTRA SCREENS?

Combs sieve bottoms are made of very heavy galvanized wire in numerous gauges and mesh. Quantity discounts apply . . . it pays in many ways to order extra screens for your Combs units. Ask your foundry supply house or write us direct for complete price and specification pages on the Combs line.

Steel Rim and Bottom
For Your Combs
Riddle Types V and V-5.

For Your Combs
Type CS Riddle→

Order This Style
For Your Combs
CR Units.

SIEVE BOTTOMS

MESH	W & M GAUGE WIRE	LIST PRICES V	CR	CS	V-5
2	14	$1.30	$1.80	$2.25	$4.20
3	16	1.30	1.80	2.25	4.20
3-1/2	18	1.30	1.80	2.25	4.20
4	18	1.30	1.80	2.25	4.20
5	20	$1.30	$1.80	$2.25	$4.20
6	20	1.30	1.80	2.25	4.20
8	20	1.30	1.80	2.25	5.00

Discounts 1 to 5—Net
6 to 23—5%
24 or more—10%

Can be mixed meshes but for same type machine.

Steel Rims
Type V $3.60 set
Types CR-CS 5.10 set
Type V-5 14.50 set

COMBS FOUNDRY RIDDLES AND SCREENS DISTRIBUTED BY ALL LEADING FOUNDRY SUPPLY HOUSES

Great Western
Manufacturing Company
LEAVENWORTH, KANSAS

(*Continued from page* 202)

the industry that is to use them. The authority to set up such a system generally is vested in the engineering department or drafting room, which is as it should be since it is the source of the part design (the mechanical drawing). The methods are mentioned here merely because of their importance to the pattern storage recording system.

The simplest numbering system is by Arabic figures in a running order until a previously agreed upon number has been reached. To this may be added a prefix which may be a Roman numeral or letter of the alphabet. This is sufficient for a small industry.

Some industries have grown to such magnitude that they have branch industries located in various parts of the country. These branch industries have several plants within one city. Because of the relatively small number of patterns made as compared with articles manufactured, centers for patternmaking have been established. Since patterns are made for distantly removed plants that have their own pattern storage buildings the pattern identification would start with the city symbol, as C for Cleveland. This would be followed by the plant identification as Cuyahoga Valley, making the pattern number thus far CC. The plant may have a special department as "machine shop", making the identification CCM. The pattern number in the sequential pattern manufacture might be 567. The pattern number would be CCM-567 and would so appear on all records. This is merely an illustration of the build-up of a pattern number.

Accuracy Important

The importance of an accurate means of identification can be seen when it is pointed out that patterns made for a manufacturing plant in one city are often used in like plants in other and far removed cities. Pattern duplication would be expensive and time consuming. The cost would also be reflected in the overhead or final cost of the product.

Information for locating patterns in the pattern vault depends on the type of pattern storage that is involved such as:

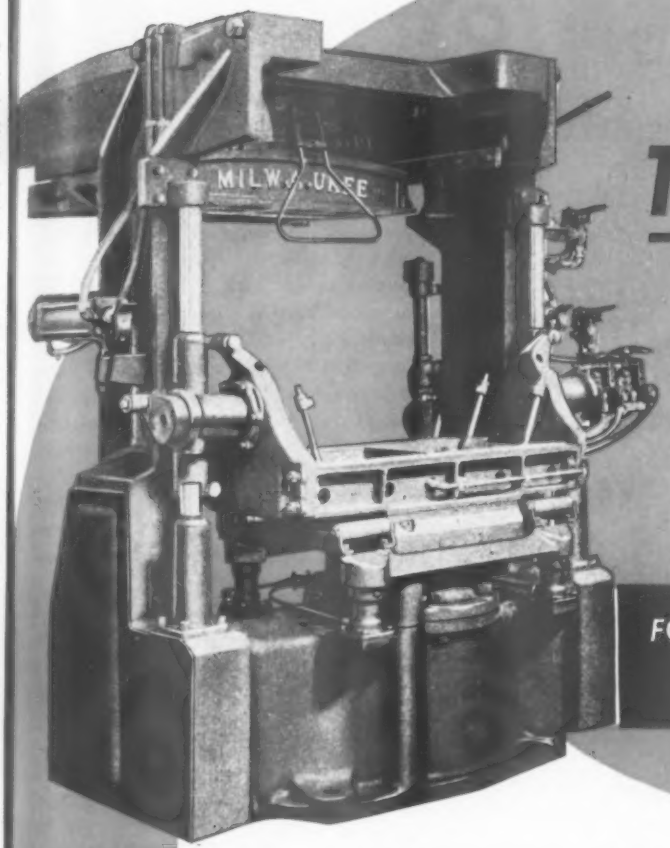
1. If the pattern vault is one of several buildings, the building number must be included (*Bldg. 1*).

2. If the vault has several floors, the floor must be included (*Bldg. 1—floor 3*).

3. The aisle on runway is added (*Bldg 1—floor 3—aisle 6*).

4. The unit of storage is next and may be: Open shelving (*Op Sh*); bulk piling (*Blk*); drawer storage (*Dr*); bin storage (*Bn*); storage racks (*Rck*); open storage

(*Continued on page* 206)



Get TOP Production with this Winning Combination

FOR DRAGS—Milwaukee Jolt Squeeze Rollover Draw (in Jolting Position)

● If you operate a production foundry, here are just the machines you've been looking for — (1) a speedy Jolt Squeeze Rollover Draw with automatic leveling and smooth pattern draw, combining jolt, squeeze, rollover and pattern draw in the simplest possible operating cycle — (2) a fast Jolt Squeezing Stripper with car suspended squeeze platen that permits fully automatic overhead mold removal. On DRAG production, the molds are discharged on a roller conveyor...on COPE production, the molds are automatically set on storage rollers at a height convenient for closing. Up to 72 molds per hour is the actual production record of these sensational, foundry-engineered molding machines.

Call in a Milwaukee Foundry Equipment Engineer. He is a practical, seasoned foundryman and will gladly assist you with your foundry production problems.

FOR COPES — Milwaukee Jolt Squeezing Stripper (in Jolting Position)

MILWAUKEE Foundry Equipment Co.

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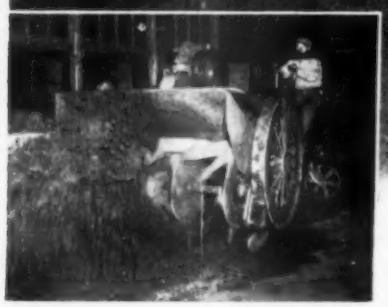
CUT and PILED...



WITHOUT COSTLY HAND SHOVELING!

One machine, one man, one operation . . . cut and piled . . . the whole job done better in less time with less labor. For foundries the nation over, the American Sandcutter answers today's sand conditioning problems.

There is no equaling the condition of sand cut with a Sandcutter. It's whirling blades cut through the heap again and again . . . cutting every foot at least 100 times. Compare these results with those obtained by ordinary handcutting methods. A man with a shovel usually cuts each foot of sand only 6 times. Compare also the savings in time . . . labor . . . rejects . . . and overall costs. You'll find that the Sandcutter cuts more than sand! Check the case histories below. What the Sandcutter has done for others, it can do for you.

"We have had three Sandcutters in operation steadily and have found that they save the labor of 'twenty-six men'."

"With our American Sandcutter, one man in two or three hours can do as much as one man can do in four days by hand methods."

"We are cutting 150 to 200 floors nightly with one operator. This would mean at the present time the work of about fifteen men per night, were the cutting done by hand."

Make these comparisons for yourself wherever the Sandcutter is used. You will see that it steps up the whole efficiency of plant operation.

WRITE FOR COMPLETE CATALOG

The "American Line" catalog illustrates and describes every Sandcutter model as well as all other American Foundry Equipment Co. products. Send for your free copy today.

American Sandcutter

FOUNDRY EQUIPMENT CO.
505 S. BYRKIT STREET, MISHAWAKA, INDIANA

(*Continued from page* 204)

wells (*O S W*).

The complete means of locating would be: *Bldg. I*, Floor 3, *Ais.* 6, *Sec. A*, *Dr* 5 (or *Bn* 7, etc.) If floor plan is laid out in clocks, the section is recorded (*Bldg. I—Floor* 3—*Aisle* 6—*Sec. A.*) To this would be added: Date shipped, pattern condition, where shipped, number of castings ordered, and date returned.

A cross index is sometimes used to locate the pattern at a particular foundry. The record card is the same but is filed alphabetically under the foundry name. The system involved a double card index but cuts down the time used in looking through the live file as it includes only those patterns that are in actual production.

Obsolescence: No discussion of pattern storage would be complete without considering the obsolescence of a pattern, when and under what conditions it should be declared obsolete and when it should be removed from the pattern storage. It is more difficult to determine pattern obsolescence than that of machinery.

In the case of machinery, obsolescence sets in when the machinery stops producing. Keeping a yearly inventory of its production output soon enables management to tell when the machine is of no more use. It is then declared obsolete and will be scrapped or sold to make room for more modern equipment. Patterns, however, may be in greater demand years later than when made, because of their usefulness in making castings for repair parts. Consequently, their value in such cases must be gaged by their replacement value.

Temporary patterns, such as those for die work, master patterns and jigs and fixtures, are quickly disposed of and present no storage problem.

Standard patterns that are used continuously or at regular intervals as seasonal jobs cause no storage question, because their storage is a must. If a replacement of new design is made, the old one is declared obsolete and discarded.

Mediocre patterns that are made for a limited number of castings or machines must be kept in storage even though no immediate re-order of castings is expected.

What are some of the considerations in determining obsolescence?

1. Obligation of the company manufacturing the product to keep patterns for repair parts. When the patterns are finally declared obsolete, the customers should be notified so they may have an opportunity to order spare parts before the pattern is destroyed.

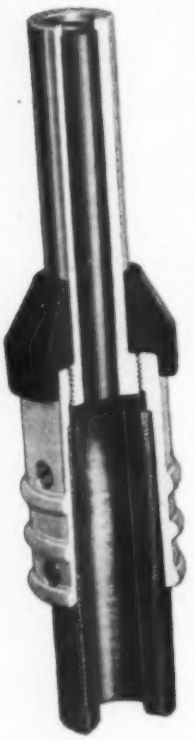
2. When a pattern was first made

(*Concluded on page* 208)

This valuable booklet contains pictures, charts, specifications and text covering the Roto-Clone method of process dust control as applied to a wide variety of industrial dust problems. Complete descriptions of each of the four types of Roto-Clones point up their greater simplicity, increased efficiency, compactness and lower operating costs. You can request your copy without obligation.

AMERICAN AIR FILTER COMPANY, INC.
Incorporated
286 Central Ave., Louisville 8, Ky. • In Canada: Darling Bros., Ltd., Montreal, P. Q.

AAF ROTO-CLONE
FOR PROCESS DUST CONTROL
ROTO-CLONE IS A REGISTERED TRADEMARK FOR A DYNAMIC PRECIPITATOR OR HYDROSTATIC BAFFLE TYPE WET COLLECTOR



NO OTHER NOZZLE...

WILL OUT-PERFORM A PANGBORN-NORBIDE*

● We feel safe in making this challenge because of the consistency with which Pangborn-Norbide* nozzles have outperformed their guarantee of 1500 hours with metal abrasive, 750 hours with sand.

● The liner is boron carbide—the hardest material ever manufactured for commerical use. Compared with iron nozzles, the Pangborn-Norbide also decreases air consumption from 10% to 20%, and by maintaining stream contour and abrasive velocity, improves blasting efficiency.

● Order nozzles from Pangborn Corporation, 284E Pangborn Blvd., Hagerstown, Maryland—*world's largest manufacturer of blast cleaning and dust control equipment.*

*Trademark of Norton Co. for Boron Carbide

MAXIMUM WORKER CONVENIENCE...

CLEANING SMALL METAL PARTS

● Improvements that help the worker do a better job *easier* are built into Pangborn's "Utility" Suction-Feed Blast Cleaning Cabinet.

● The 10" x 8" window is protected by a sliding screen which may be moved to the side for inspection of work, and permits wiping of vision window glass during cleaning. The vision opening is shielded against outside light.

● Arm openings are ample, and are fitted with abrasive-resisting rubberized canvas sleeves and gloves to protect the operator while handling the work and the blast gun. A push-and-pull rod controls the abrasive from inside the cabinet.

● Further facts in Bulletin No. 601. Address the Pangborn Corporation 2284 Pangborn Blvd., Hagerstown, Maryland, *world's largest manufacturer of blast cleaning and dust control equipment.*

Pangborn

PANGBORN CORPORATION, HAGERSTOWN, MARYLAND

(*Concluded from page* 206)

Various estimates set the life of a pattern from two to ten years (some three times as long).

3. Make a distinction in the use of patterns for parts that wear out, oxidize, corrode or burn up and those that need no replacement unless an accidental breakage occurs.

4. Compare the value of the storage space with the cost of pattern replacement.

5. Time that has elapsed since the pattern was last used.

6. Condition of pattern.

When the obsolescence of a pattern is in question or a disagreement arises in the committee inspecting the patte it is best to have temporary storage set aside for such patterns. This storag would be valid for a period of time arrived at by the same committee. The lapse of this time automatically sets the day for the pattern destruction unless i the meantime its use has been revived.

Process Metallurgy Laboratory Opened

Massachusetts Institute of Technology has established a laboratory of mechanical metallurgy under supervision of Dr. John Wulff, where advanced courses in process metallurgy as well as undergraduate instruction will be offered. Dr. Wulff, who joined the institute staff in 1931 as an instructor and recently had been associate professor of metallurgy, has been promoted to the rank of professor. Howard F. Taylor, research associate at the institute since November, 1945, and formerly with the Naval Research Laboratory, Washington, has been appointed associate professor of mechanical metallurgy.

Publishes Bulletin

Acid Open Hearth Research Association Inc., P. O. Box 1873, Pittsburgh, has published bulletin No. 1 on "Acid Open Hearth Slag Fluidity and Its Significance," by G. R. Fitterer, J. W. Linhart, B. B. Rosenbaum, J. B. Kopec, S. Poch, and W. G. Wilson. It describes the development of a standard slag fluidimeter, recommended procedure in using it, and a method of control utilizing the fluidimeter. By means of the proposed control method it is possible to determine the point at which the charge is melted; amount of limestone and ore to be added and the time; and the point at which the heat should be blocked. Copies of the bulletin may be secured for $1 each from the association.

VOLCLAY BENTONITE

NEWS LETTER No. 14

REPORTING NEWS AND DEVELOPMENTS IN THE FOUNDRY USE OF BENTONITE

BENTONITE BENEFITS NATURALLY BONDED SANDS

Control is as essential with naturally bonded sands as it is with synthetic sands.

Three physical properties must be controlled in following proper sand practice — 1) Green Strength; 2) Dry Strength; 3) Fired Strength.

Many naturally bonded sands are weak and must be built-up in strength without sacrificing the casting finish. This is accomplished by adding Volclay or Panther Creek Bentonite to the naturally bonded sands.

Cuts, washes, cope drops, swells, sand inclusions and many additional casting defects occur in weak sands.

The use of a small percentage of Volclay or Panther Creek Bentonite helps eliminate these defects.

Weak sands require too much water, giving "false plasticity".

Cutting at the gates may be overcome by adding a small percentage of Volclay to the gating sand, thus increasing the fired strength.

Bars, gaggers and rods in the cope may be reduced or eliminated if proper green strength is maintained by adding bentonite.

By increasing green strength and eliminating the bars or rods "hard spots" decrease. "Hard Spots" sometimes result from the bars or rods being too close to the casting surface, chilling the incoming metal.

Gangway sand may be saved.

Shakeout sand may be "built-up" with bentonite before it is returned to the system. This saves new sand additions.

As little as one-half pint of bentonite to one hundred pounds of sand (naturally bonded) is sufficient to maintain working strength.

Volclay or Panther Creek Bentonite may be sprinkled on the top of each mold before shakeout if no muller is employed in the shop. The small amount required mixes readily.

Panther Creek or Volclay may be scattered over the floor before cutting through, and they each blend into the sand naturally.

Save sand by small additions of bentonite.

Save labor in ramming, jolting, butting and tucking by holding green strength with Volclay or Panther Creek Bentonite.

A little goes a long way.

AMERICAN COLLOID COMPANY

363 WEST SUPERIOR STREET • CHICAGO 10, ILLINOIS

Producers of Volclay and Panther Creek Bentonite

READERS' COMMENT • • •

Co-operation Needed

To The Editors:

Considerable thought is being given to encouraging instruction in foundry practice in universities and technical schools throughout the country. Is this a one-sided wishful thinking proposition, or is there some real co-operation being shown?

The reason for this question lies in the experience of the writer who has been connected with the foundry industry since 1914, a graduate of an eastern trade school of high repute, holder of a vocational teaching credential, and five years teaching experience in vocational foundry practice.

An abundance of objectives and a surplus of lip service does not contribute much toward a worthwhile program unless someone in authority rolls up his sleeves, sticks his chin out and does something about it. One institution has been planning to incorporate foundry in their engineering courses, for five years, but they are still in the talking stage.

Nearly everyone thinks of a foundry as a good place for minority groups who are presumed to be long on brawn and short on brain. That holds true in many of our public educational systems to the extent that students with high or average intelligence quotients are encouraged to take courses where opportunities are much more limited and competition much keener than in the metal casting industry.

In many instances vocational courses are maintained because there is a "trend that way", and also to take care of those students who are in school for no other reason but that the law requires they go to school until they reach a certain age; those with little or no ambition or initiative; those seeking escape from academic subjects and hope to get away from home assignments; and those dropped from other classes because of poor scholastic standing and thus cramp the instructor's style and tax his patience.

From such as these a vocational teacher must try to make mechanics of a quality that he can place at least 75 per cent in employment and still remain on good terms with industry. Otherwise, the governing board may decide there is no justification for continuing the class.

The writer has had a fair degree of success, considering the material, shop facilities, and the co-operation of a number of progressive foundrymen. However, much more could have been accomplished had the foundrymen shown a more convincing group interest and more contacts with educational authorities.

Setting up a trade course of instruction requires a great deal of planning, and much of the successs or failure of the program originates in this stage. Students in industrial and trade classes are entitled to as good surroundings, classrooms, equipment and teachers as those enrolled in old-established courses. They should enjoy and have all the privileges shared by other students. There is no justice in forcing an industrial course to support itself. No one ever expected a Latin class to be self-supporting.

Too often the engineering of a new program is left in inexperienced hands; the course gets away to a poor start because half of the facilities are missing. A teacher is at a serious disadvantage if the students' interest is lost due to lack of facilities or material.

There should be close co-operation between the school and the industry. Shop advisory committees should meet somewhere other than on paper. Constructive criticism is alway helpful, and should be welcomed by any instructor.

The program should be stimulated by a practical mechanic who is teacher-conscious, and who is ambitious enough to make the sacrifices necessary to secure the credentials required, and who is not looking for an easy job.

Industry should be interested in keeping the teaching content usable and up-to-date. It should recommend competent men for teachers and should exert its influence to secure for the teacher a salary consistent with professional standards in industry. This may differ from salary schedules set up by educational authorities who like to think in terms of degrees and training for the job, rather than the measurable results of a job well done.

The writer is whole heartedly in favor of more foundry training. The opportunities are greater than ever before, and competition is down to a new low. The applicant should be of average intelligence, unafraid of work, willing to get his hands dirty, work up a good sweat, and make a habit of reading foundry literature. If he will do these things and leave the booze alone he will make good or I'll eat your hat. I've seen it work.

Wm. Lewis Todd
Foundry Instructor
Pasadena Jr. College
2629 *Poplar Place*
South Gate, Calif.

Foundry Opportunities

To The Editors:

In practically each issue of The Foundry emphasis is laid, and rightly so, on the lack of skilled foundry workers, real molders, machine molders and helpers. The lack of an attractive future and the hard dirty work that a foundry has is strongly stressed by inference, if not as a decided statement.

As an old-time molder and foundryman who served his 5-year apprenticeship over 35 years ago, I should like to say it was not so in those old days. The trade had the same drawbacks and worse, even then. It was dirty, smoky, and hard sweaty work. The flour sand cores of those days produced an exceedingly acrid smoke that brought tears to the eyes and a cough to the throat when standing over it to pour, and there was not the mechanical handling and pouring apparatus that we now have. We made our molds, poured off, shook out, knocked off gates, wet down and cut over our sand before the day's work was through.

Yet there was a waiting list of apprentices. A boy had to have an inside pull to get started at $2 per week or await his turn on the list. The foundry owner or manager could pick his apprentices with good, strong intelligent boys to choose from.

Today the situation is utterly different. The hard, heavy part of the work has been taken out to a large extent. Gases, dust and smoke around the shop have been practically eliminated. The jobbing molder's average age is 45-50 years. Now, as the Army and Navy are discharging young men hardened physically and mentally compared with the grammar or high school graduate, the supply of apprentices should be assured. But the fact remains that young men are not attracted by and to the foundry industry. Why not?

The first answer that comes to mind concerns the wages paid a journeyman jobbing molder in relation to the wages paid journeyman mechanics in other trades and callings. In those days a good jobbing molder could get $2.25 to $3 per day for ten hours, while other trades were only making $2 to $2.50. The molders of that day (1890-1912) who were not spending too much of their earnings in saloons had nice homes, better than the average mechanic owned, and paid for. They lived on a higher standard and were looked up to in the community as better than average citi-

(*Continued on page* 214)

WHO *wants this* DIRTY, SWEATY JOB?

Charging cupolas by hand is about the hottest, dirtiest job there is. Foundries that are confronted with a constant labor shortage will be well advised to put Mechanical Charging at the top of the list of needed improvements.

Those who install Whiting Chargers to save labor are often amazed at the many other benefits their equipment brings . . . higher coke ratio, greater melting speed, increased output, and better over-all operation.

Whiting has designed and built Mechanical Charging equipment for over 40 years. We supply anything from simple skip hoists for small cupolas to completely mechanized systems for the largest foundries — or anything between. We can show you *more than 400* successful installations.

Write Whiting Corporation, 15607 Lathrop Ave., Harvey, Illinois, and let Whiting's experience in mechanical charging provide an installation that will bring the greatest benefit for the least cost.

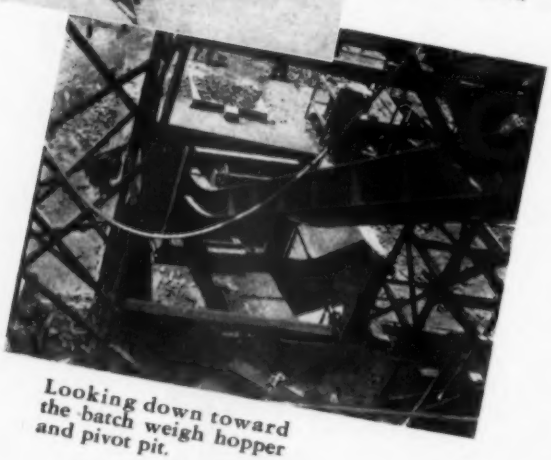
SEE TYPICAL WHITING MECHANICAL CHARGERS

on next page . . .

WHITING

SWIVEL CHARGERS

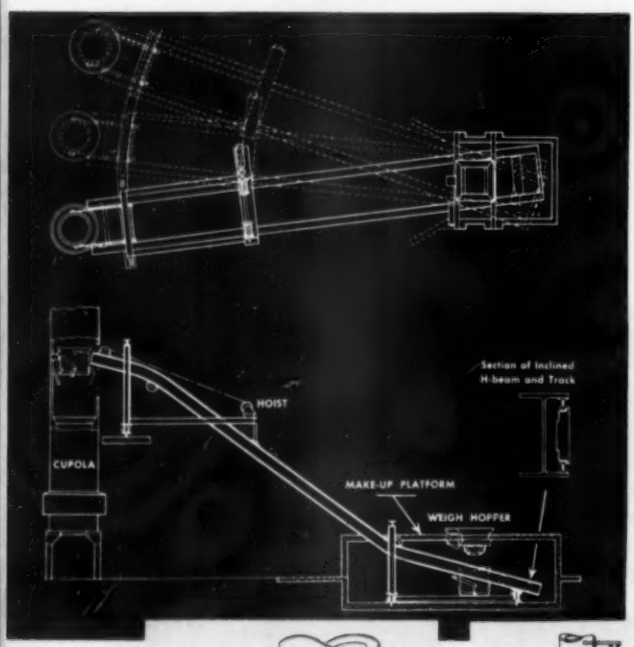
The hoist drive (top) as seen from the charging door level.



Looking down toward the batch weigh hopper and pivot pit.

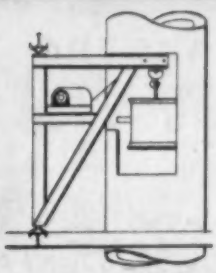
The Whiting Swivel Charger is an inclined skip hoist that is pivoted at the lower end, and designed so that the upper end swings on a semi-circular track to serve two, three, or four cupolas. Shifting from one cupola to another may be either hand or electric powered; and when motor powered, the push button control can be provided with an ingenious automatic indexing arrangement.

Buckets may be of the cone bottom type, or have single leaf or double leaf drop bottoms, as circumstances may dictate.

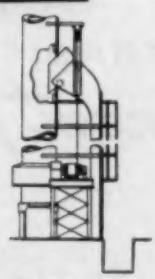


Showing how the Whiting Swivel Charger serves multiple cupolas.

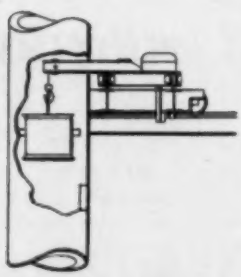
Empty bucket descending. Drop bottom leaf has just reached the automatic closing mechanism.



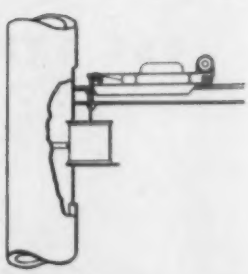
Jib crane type charger



Vertical side-dump skip charger



Overhung crane type charger



Horseshoe crane type charger

rve 2 or more cupolas

Semi-circular track enables charger to serve two cupolas.

We invite your investigation of this equipment, as well as the many other types of Whiting Mechanical Chargers which are available. Our engineers will gladly consult with you and recommend equipment suitable to the needs of your particular operations.

WHITING CORPORATION
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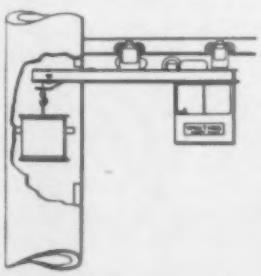
Offices in Chicago, Cincinnati, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, St. Louis, and Washington, D. C. Agents in other principal cities. Canadian Subsidiary: Whiting Corporation (Canada) Ltd., Toronto, Ontario. Export Department: 30 Church St., New York 7, New York.

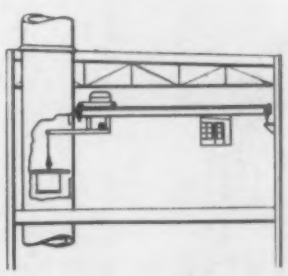
Looking up the incline. Note the double I-beam track construction.

View showing top of weigh hopper and scale. Note descending bucket.

Drop bottom leaf closed. Note how lower end of track is mounted on turntable.



Monorail type charger



Underslung crane type charger

WHITING
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CRANE & HOIST CORPORATION

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(*Continued from page* 210)

zens. So the apprentice molder, when asked by an adult friend as to where he was working, would answer proudly, "I am an apprentice molder, working at so and so Foundry." The adult friend usually replied, "Well, you are O. K. It is a good, well-paid trade." This gave the apprentice a pride in his trade.

The case today is far different. Molders are rated at $1.02 per hour, average. True, there are higher rates paid. The carpenter, the plumber and the mason are far more highly paid. The average union carpenter earns $1.60 per hour. The molder's daily production has been forced to a higher level while his wages have not kept pace. To a large extent, his pride of craftsmanship has been taken away by molding machines and mechanical production units, which, for volume and mass production, have to be. But to the average apprentice boy there's not any pride of craftsmanship developed. It's all muscle and not much brain.

As the molding problems involved are solved beforehand by some technical college graduate, the apprentice is not a molder as we old-timers understood the term. He is simply a machine operator, the machine calling for so much production each day (usually plenty high, set by another college graduate called a "time study man") and the earnings of such a machine molder are usually topped by an outside tradesman's helper. Possibly the foundry management cannot pay higher wages and show a profit as sales prices are frozen for castings by the government. But does one remember the cut-throat competition that was commonplace during the depression when unethical buyers of castings quoted a competitive foundry's price to another foundry and usually secured a lower figure? With the scarcity of work, many shops were caught in the freeze with the low selling prices. "As ye sow, so must ye reap," but usually the molder suffers in loss of wage raises.

What must be done now to attract boys and young men into the foundry? Machine operators can be made in from two to six weeks, but not a highly skilled jobbing molder. Getting rid of dirt and grime is not enough.

Some hard work can be lessened by mechanical devices, but the jobbing molder's trade is no sinecure. A good jobbing molder must attain a high degree of skill that calls for brains in improvisation, a sound knowledge of all foundry fundamental laws and a higher degree of knowledge than any other skilled trade. Mistakes on a molder's part usually result in costly scrap.

So bring the molder's wages back to their former position. He is the "king pin" craftsman, and no other craftsman

(*Concluded on page* 216)

There's a CARL-MAYER OVEN for every foundry requirement!

The Right Type and Size for top production and lower costs.

For more than 25 years, Carl-Mayer Oven engineers have brought forth outstanding developments for fast baking, uniform baking and fuel economy. Therefore, when you choose Carl-Mayer Oven Equipment, you are assured of the best in all around operating efficiency.

Want the users' verdict? We'll gladly arrange contact with customers in your locality.

Write for Bulletin

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Fremont Foundry Co.
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Gilbert & Barker Co.
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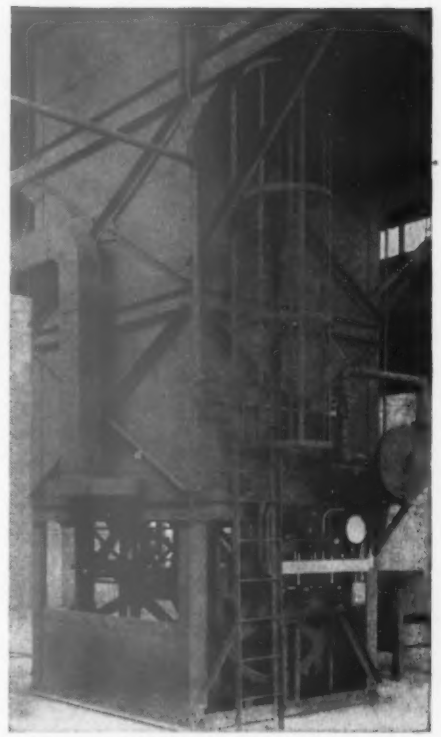
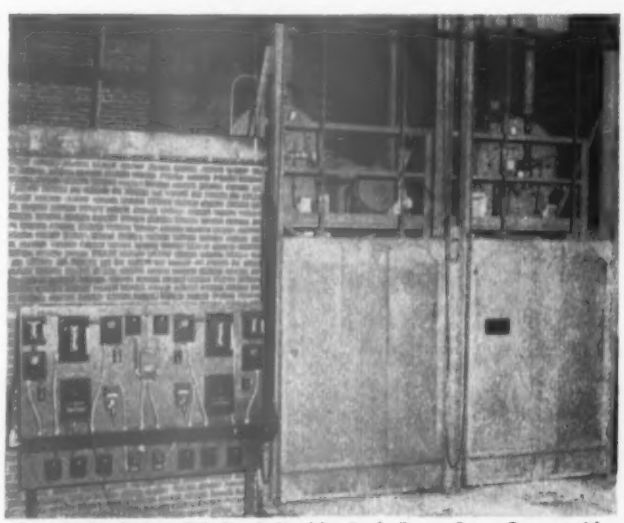
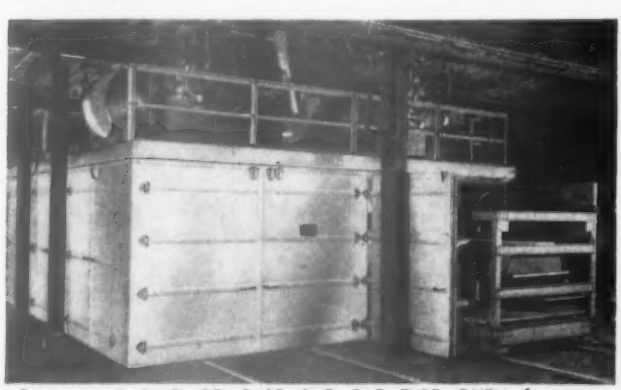


CARL-MAYER VERTICAL CORE OVEN in brass foundry of The H. B. Salter Co., Marysville, Ohio, manufacturers of heating and plumbing fixtures.



Two Recirculating Oil Fired Double Rack Type Core Ovens with Lift Doors, as installed for The Crucible Steel Castings Co., Lansdowne, Pa.

CARL-MAYER MONORAIL CORE OVEN at Packard Motor Car Co.



CARL-MAYER TWO COMPARTMENT CAR TYPE OVEN for cores and molds. Also has doors on side permitting its use as a rack type oven.

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When we're recommending equipment to handle air, or gas, we're completely unbiased as to Centrifugal or Rotary Positive machines. That's because of our *dual-ability* to select, design and build whichever type of unit best meets your needs.

This *dual-ability* is at your service, for a 10 CFM or a 50,000 CFM (or higher) installation. You can rely upon our recommendations and the performance of our equipment, because there's almost a century of successful air-handling experience behind them. Call on us, without obligation.

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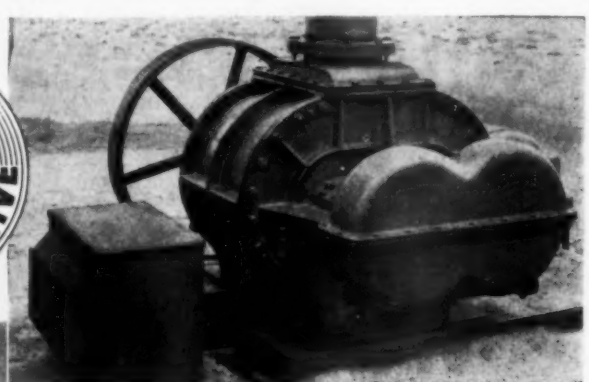

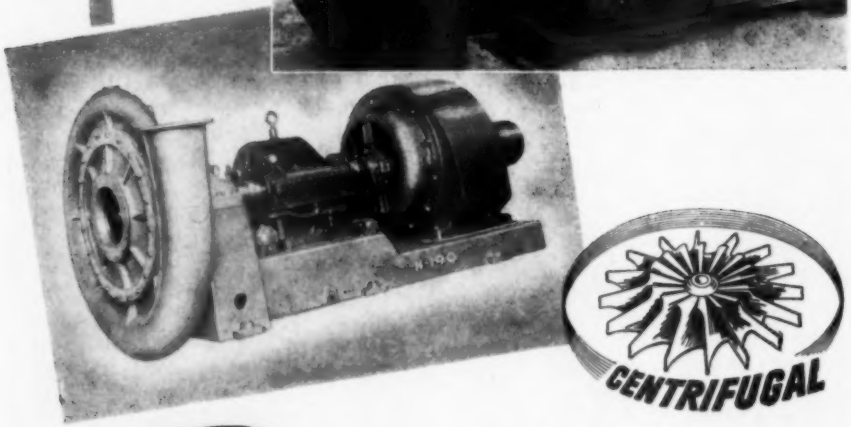

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BLOWERS FOR EVERY NEED

ROTARY POSITIVE AND CENTRIFUGAL BLOWERS • EXHAUSTERS • BOOSTERS
LIQUID AND VACUUM PUMPS • METERS • INERT GAS GENERATORS

(*Concluded from page* 214)

should have a higher wage than the good, skilled, jobbing molder. Your college-trained metallurgist and engineer pay in cash for their education. The thoroughly trained jobbing molder learns his skill through application, observation and practice and is equally as valuable in the shop as the other. Possibly, the practical molder can improvise more safely, more cheaply, and produce your wanted casting at less cost. Pay your help, skilled and semi-skilled, in proportion to other skilled trades (the plumber, the mason and the carpenter) and there will be no lack of applicants for foundry jobs. American young men aren't as gullible as some foundry owners and managers would like us to believe, but they are good salesmen and you won't buy them at a lower figure despite high sales talk of "foundry opportunities."

Make every job show a legitimate profit, no cutting prices illegally. Recognize the skill, the sweat and the hard work that goes to produce castings and pay accordingly. The builder does it, the farmer does it, why not the foundry?

JOHN J. OAKLEY

114 78*th St.*
Niagara Falls, N. Y.

Book Review

Occupational Rating Simplified for Foundries, by Gottfrid Olson; 61 pages 8¼ x 11 in.; ring type binder; published by National Founders Association, 120 South La Salle street, Chicago 3, $2 per copy.

This is the second edition of a brochure compiled under the auspices of the National Founders Association. It offers a plan by which an equitable wage structure may be built. Details are set forth clearly and summarized in the occupational rating schedule which makes it unnecessary to go through a maze of figures. It is claimed that the information is obtained as easily as reading a road map.

The plan is offered not as a fixed method to be accepted regardless of the present set up, but rather as a guide to those who feel the need of a better wage payment plan. All occupations are classified. Determining factors number only seven. It is pointed out that hair splitting and extensive figuring to establish points are avoided. Scope of the work is indicated by the table of contents: Occupational rating as a tool in production control, occupational rating factors, interpretation of rating factors, factor values determined, basis for differentials, the going rate bogey, occupational rating schedule master table, occupational classification by factors and graphs, job descriptions, merit rating.

K-102

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We present these new Electro Tercod CONQUEROR CRUCIBLES as technological triumphs over all previous practical limits of density, strength, heat conductivity, flame resistance, thermal flexibility and resistance to metals and slag. They effect fuel and time savings and are unquestionably the most durable crucible ever produced. So good that they confound competition!

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The Adventures of BILL

By PAT DWYER
Drawings by RICHEY

I'VE often wondered," Bill said the other night, "about this here writing racket. Firstly, as the preachers say, how does one get into it, and secondly, how do you hatch up stuff to write about? I can understand how any person—well, almost any person—could dash off a piece now and again. I've often felt like doing it myself, but for one reason or another, never quite got around to it. These column fellas on newspapers knock out a yard or two of more or less interesting material every day. In between times they do a bit of braying on the radio and presumably, in their spare time, they write books, I never read any of 'em, but that is neither here nor there. If you know anything about this writing game, you can spill it quite freely in front of me. I can assure you I have not the slightest intention of trying to steal the trade. Trade, hey? I guess that's a joke, son!"

"Bill," I said, "if medals ever are given out for askers of useless and sometimes embarrassing questions, you will be awarded the largest and shiniest with a long, green ribbon to hang it around your neck. How would you like to have a member of that well known group, a tinker and a tailor and a soldier and a sailor and a sober little Quaker in a long tail coat, come up to you, hook an index finger in the top button hole in your vest and say: 'Hey, feller. Tell us how castings are made.' The answer to that question would not involve any more detail than an attempt to explain where writers get material. Sometimes it is the result of inspiration. Sometimes the material is handed over almost ready-made by friends or enemies. In many instances the material for a story is accumulated in dribs and drabs over a comparatively long period. For example, take the two immense bronze clocks that hang from two corners of the Marshall Field store in Chicago."

"You take 'em. They are no use to me. However, I often have wondered who made 'em and what was the idea in hanging 'em up there. I also have wondered occasionally why a small group of these naughty but enterprising men who live by stealing, do not cut down one or both clocks, break 'em up and sell 'em to a junk man. There's a tidy bit of brass in 'em."

"Without doubt the idea has occurred more than once to alert members of the brotherhood prowling the streets by day like old time prospectors looking for promising locations. However, these craftsmen, skilled in many ways, realize their limitations. The total weight of each clock including the ornamental scroll work bracket, and extending over the sidewalk 17 ft, 6 in., is 7¾ tons. Overall height is 12 ft, 6 in., width of the clock body is 7 ft, 3 in., width of the face is 46 in., minute hand length is 27 in., and hour hand 20¼ in. The electrically-operated clocks are corrected each hour on the hour by a controlling master clock inside the store. The master clock is synchronized every day with the Arlington time signals and has a mercurial pendulum which automatically adjusts the swing to atmospheric change. The first clock was erected at the Randolph and State street corner in 1902. The second clock was set up on the Washington and State street corner in 1907."

"Positively amazing, my dear boy. Just like gazing into the crystal ball or pulling live bunnies out of a hat. Do you feel equal to taking another dive and finding out who designed and built the clocks, and—if the effort is not too great—how are the clocks attached to the building?"

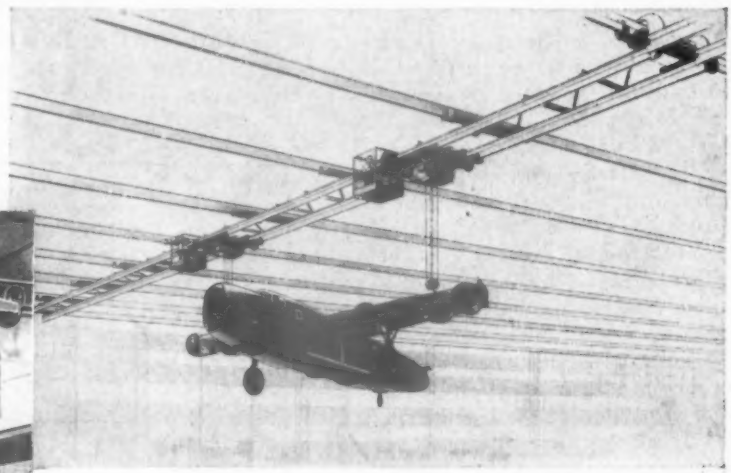
"The clocks were designed by Pierce Anderson of D. H. Burnham, Architects, and the castings were made by the A. E. Coleman Co., Chicago, prominent at one time, but out of business for many years. Each clock contains 156 bronze castings of the following approximate composition: Copper 75 per cent, tin 7 per cent, zinc 16 per cent, lead 2 per cent. Scrap content in the charge might vary from 25 to 50 per cent. Old-time foundrymen developed an uncanny ability to select what they wanted from a pile of miscellaneous scrap."

"I knew an old fella one time who ran

(*Continued on page* 220)

Name plate prompts Capital to upbraid Labor. Labor politely requests Capital to take a jump in lake

Flexible Handling with MonoRail Cranes



American MonoRail Cranes are not limited to bridging a single span. With their special interlocking and twin bridge designs, they supply over-all coverage . . . your handling is not tied down to alleyways or spotting or unloading near permanent equipment.

American MonoRail Cranes are available for any type of job — heavy or light duty — full automatic, cab controlled or hand operated. They can be installed under present operating conditions without excessive structural changes.

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THE AMERICAN MONORAIL COMPANY

13104 ATHENS AVENUE CLEVELAND 7, OHIO

(*Continued from page 218*)

a brass shop for more than 40 years. The only bit of new metal in the place all that time was a small copper ingot carefully put away in the safe every night. In the daytime it was displayed on the desk to impress actual and potential customers. He made perfectly satisfactory castings from carefully selected scrap. With that little item settled to the satisfaction of one and all, maybe you will explain how the clocks are fastened to the building."

"The frame is fastened to the wall by extra heavy 2½ x 8-in., formed ship channels riveted to structural column. The supporting bracket is a combination of ship channels, gusset plates and angle iron stiffeners. So there, my fine nosey friend, is some of the material I collected here and there with the idea of writing a sketch some day of these two famous clocks, probably more familiar to natives and tourists than any other public sight in that dynamic city at the foot of Lake Michigan."

"Well," said Bill, "maybe I am dumber than usual, or on the other or left hand, maybe your explanation is not as clear and complete as it might be. I have seen the clocks at least 147 times, but I never felt like writing a story about 'em. If there is nothing in the constitution and by-laws of the National, Protective and Benevolent Writers' Union to prevent, I should like to know why you pounced on the clocks as a subject on which to spread a few hundred words."

"A very good question indeed. Also highly gratifying in that it shows you are following the discussion with the closest attention and interest. About a year ago a prominent magazine had a typical Norman Rockwell painting of one of the clocks on the front cover. That was the beginning—"

"What's the idea of the roundabout and weasely reference to a prominent magazine? Why can't you say the *Saturday Evening Post?* After several million subscribers, random readers and picture flutterers have seen the cover picture, I do not think that the name of the publication on which it appeared is a state, naval or military secret. Unless this deplorable and almost universal double talk prostitution of our language is curbed we shall find ourselves sliding down the greased ways to a certain place in a hand-basket."

"You don't know the half of it. Between the double talkers, the half talkers and those who have nothing to say, but persist in saying it, a man does not know whether he's coming or going. You asked me what induced me to write a story about the clocks. I was well within my constitutional rights if I chose to ignore the question. Instead of taking that course, I started to explain some of the circumstances in a manner which I hoped would appeal to any person blessed with even ordinary intelligence. What was the result? You come barging in with a totally irrelevant reference to a certain publication. Who cares where the picture appeared?

"Through association of ideas the picture of the clock brought to mind something I had read many years ago on the career of Marshall Field, born Aug. 18, 1835, in Conway, a little hamlet in the northwest section of Massachusetts. He died in New York Jan. 16, 1906, at the age of 71. He received a common school and academic education in the intervals of labor on his father's farm. Like many a rural youth before and since he cordially hated the farm. At 17 he began clerking in a dry goods store in Pittsfield, Mass., and by the time he was 21 he had mastered the details of the business. The prospect of sticking around there for 4 or 5 dollars a week did not appeal to him. He packed his little cowhide trunk and headed for Chicago, a rapidly growing city at that time in the Far West. After four years' service with a dry goods firm he became a partner. In 1881, he became a partner of Marshall Field & Co., a business with an annual sales volume at that time of $25,000,000. In the 50 years of his continuous activity the city population had increased to approximately 2,000,000, and the metropolitan area has more than doubled since he died 40 years ago. Of these 7500 work for Marshall Field & Co., in the 13-story buildings covering a block and a half inside the *Loop*—."

Clock suggests visit to Joe's Place

"You don't need to tell me," Bill interrupted. "I have heard and read about Marshall Field's almost as far back as I can remember. He presented the Field Columbian Museum to the city, showered gifts on the University of Chicago and at a cost of $200,000 endowed a public library in his native Conway, Mass., in memory of his parents. A great man any way look at him. All this talk about Chicago reminds me of a letter I had some time ago from an old friend of mine out there who had trouble with a brass name plate. Here I'll read it to you:

Dear Bill: When I directed our custodian's attention to a badly corroded name plate on the church, he claimed he had made several futile attempts to polish it up. I shall appreciate any information on the proper polish, acids, etc., to restore the original luster. Since the plate is so badly corroded, I wonder will it be necessary to use a preliminary wash of some sort of acid.

"To this I replied:

Dear Ed: (I always call him Ed, because that is his name) So you're in a jam, hey?

Before attempting a reply to your valued communication of recent date, permit me to congratulate you on your apparently active interest in your church as shown by your anxiety to emulate the lad in *Pinafore* who sang a tuneful ditty about polishing up the handle on the big front door. Lightly dismissing your limousine and chauffeur with an almost imperceptible movement of the gloved left hand you approach the edifice and engage the custodian in courteous reference to the state of the name plate. The old crab is not impressed with the high hat, the long tail coat, the striped trousers and the gold-topped walking cane. He has seen 'em all come and go over a period of many years. He boldly claims the plate can't be polished and then disappears into one of these mysterious caverns in the basement where no person can find him. Applying the old sharp and professional eye to the plate, you decide something must be done. What the something is you have not the slightest idea, but that is only a minor detail. On a memorandum pad always carried in one of the coat tail pockets you hastily write: "Dump this job into Bill's lap tomorrow and let him worry over it."

Let us assemble the data and see where we stand. Alas, we do not seem to stand anywhere. You want to shine and polish a brass name plate (presumably by custodian deputy), but unfortunately you do not state whether the letters forming the inscription are raised or sunken. Obviously the treatment for one would not be satisfactory for the other. You state that the surface is corroded. This term is used loosely and in many instances mistakenly. Corrosion in metals applies to iron and steel, but not to the brasses and bronzes. Oxygen in the air unites with the carbon in the ferrous metals and as a result the surface becomes rough and pitted. Brass and bronze become covered with a protective skin, known as a patina. We are inclined to the opinion that this is the condition of your plate, a plain brass slab with the letters of the inscription cut in the surface. A vigorous scrubbing with powdered abrasive will remove the discoloration and expose fresh, clean metal. Fine sand, steel wool, or silica flour will serve in the first treatment. Afterward, any of the usual polishing compounds may be applied. Several cleaning and polishing compounds are on the market. An application of hydro-

chloric, nitric or sulphuric acid will clean the surface, but is too dangerous for use by an inexperienced person.

If the surface actualy is rough, scaly or pitted, you can detach the plate from the door or wall and hand it to a brass foundryman who will give it a few rubs on a grinding wheel or a sanding belt to remove the dirty skin and expose nice clean metal. For a slight financial consideration he will polish and shine the surface so that the custodian can see his old wizened puss each time he passes by. And then Ed, as a last desperate measure, you might loose your grip on a little folding money and have a nice new plate made.

"Talking about folding money," Bill remarked as he folded the precious documents and stowed them in a hip pocket, "reminded me of something I intended to ask you before. Is there any money in this here now writing racket?"

"Well," I said, "yes and no. For example I read an item recently where a famous lawyer wrote a 100-word opinion on a will, and collected a fee of $100,000; or $1000 per word."

"Some fee," Bill commented admiringly. "I suppose you don't happen to know if this lawyer was a relative of Fee-Fie-Fo-Fum, the giant who lived in the golden house at the top of Jack's Bean Stalk. Good night!"

Book Review

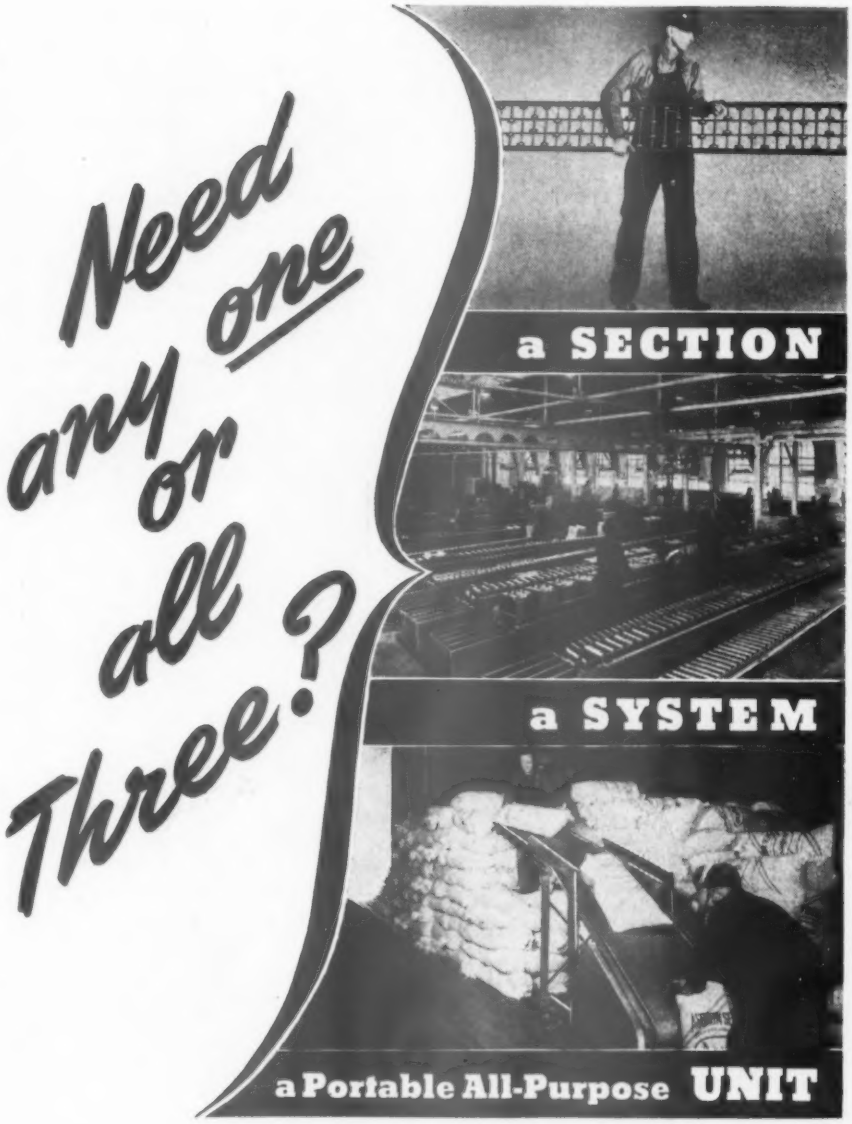
Modern Organic Finishes, by Rollin H. Wampler, cloth, 445 pages, 5¾ x 8¼ in., published by Chemical Publishing Co. Inc., Brooklyn, N. Y. Price $8.50.

The author presents the latest practical commercial methods of preparing surfaces for finishing, applying organic protective and decorative finishes, drying these finishes and how these methods apply to many varied types of products. He indicates the materials and equipment now available and describes good practices and typical procedures.

The book is primarily one of methods. Descriptions of modern finishing materials and equipment for their application, drying and conveying are presented so that the reader may have an overall picture of modern industrial finishing operations.

One eight-page chapter is devoted to finishing iron castings. Finishing processes for wood, plywood, paper, plastics, automotive and railway equipment, sheet steel, and aircraft are described. Rubbing and polishing organic finishes are also discussed.

The subject is presented in six sections: "Modern Organic Finishing Materials," "Modern Application Methods," "Drying Methods," "Product Handling in the Finishing Department," "Finishing Processes" and "General Considerations" in which good practice in the finishing department and testing and evaluating finishes are discussed.



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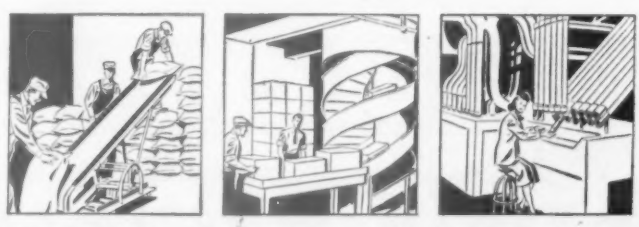

ROLLER · BELT · SLAT · PUSHBAR CONVEYORS · PORTABLE CONVEYORS AND PILERS · SPIRAL CHUTES · PNEUMATIC TUBE SYSTEMS

TEST BARS FOR 85-5-5-5 ALLOY

(*Concluded from page* 190)

4. The melt is poured rapidly enough to maintain a full sprue of metal at all times, and the pouring lip is held low. If necessary, the mold should be set high enough to make this possible when pouring a full pot of metal.

5. The same sand as used for the other castings is employed.

6. Good moisture control is employed and the use of water and mold coatings is avoided.

7. The melt quality is judged on the basis of the average tensile properties of at least two sound bars and not on individual bar values.

8. The test bars from various melts are poured at the same temperature, preferably near 2200 F.

Conclusion—At a recent meeting of the Non-Ferrous Ingot Metal Institute, I summarized the results obtained at Battelle Memorial Institute as follows:

1. Non-Ferrous Ingot Metal Institute members sell copper-base alloy ingot not only upon the basis of chemical analysis but will guarantee that the metal will meet the physical requirements and specifications when the sand-cast test bar is made in accordance with the *recommendations* for the separately cast test bars contained in the respective ASTM specification for the same alloy for sand casting.

2. That the separately cast test bar is now quite generally accepted as the only proper means of determining "melt quality."

3. The subject of test bars is quite universally a subject of controversy among foundrymen and their customers.

4. The project was undertaken for the purpose of developing standardized practice by which "melt quality" may be dependably determined; also to furnish information valuable to the foundrymen—who comprise the customers or the ingot producer.

To Review Information

5. To take advantage of the information developed, it is proposed to organize, under the sponsorship of the ASTM, a task committee to review the information presented in this report as well as all other available information on the subject. It is proposed that the task committee be representative of all groups interested in the promulgation of specifications covering copper-base alloy castings. The task committee shall be given the assignment of making such recommendations as are indicated. The task committee report, together with its recommendations, will be submitted to subcommittee B-1, committee B-5 ASTM on copper-base alloys for sand castings. That committee will act on the same in accordance with regulation ASTM procedure.

Acknowledgments—The writer desires to extend grateful acknowledgment to the assistance rendered him in preparation of this study to the following: Members of the Metallurgists' Advisory Committee of the Non-Ferrous Ingot Metal Institute for general supervisory assistance on the project; George P. Halliwell, chairman, H. L. Smith and J. F. Ednie, members of the Research Sub-committee of the Metallurgists' Advisory Committee; Leighton M. Long, Leighton M. Long & Associates, Toledo, O., for consulting service on foundry problems; C. W. Barnhart who conducted the metallographic work; J. R. Doig who performed the microradiographic investigations; and to J. G. Kura, research engineer; L. W. Eastwood, assistant supervisor, and C. H. Lorig, supervisor of the Process Metallurgy Division, Battelle Memorial Institute, Columbus, O., under whose direction the project has been carried on.

THE TEST THAT PROVES IT BEST!
Lining
Buckeye Silica Firestone Lining
27"
29½
48"
54"
Buckeye Silica Firestone is the best refractory for lining cupolas . . . the above test is one of many that prove it!
The diagram shows a test that was made by a large foundry to compare the refractory efficiency of Buckeye Silica Firestone with the manufactured material this foundry had used for years.
One-half of the melting zone of the cupola was lined with Buckeye Silica Firestone, the other half with the other material. Under identical conditions, the Buckeye Silica Firestone burned only to a depth of three inches while the daily patch of the other material burned completely through as well as one inch of the backing next to the shell.
Next time, line your cupola with Buckeye Silica Firestone . . . its simplicity of use, superior refractory qualities, longer life, and definite contribution to scientific cupola control have influenced foundries all over the country to adopt it as standard.
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SOME TIME WHEN YOU'RE TALKING OVER

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it is quite likely that you may mention some of our engineering projects or foundry executives familiar with our services, since we have contributed to more than 300 foundry engineering projects. The large staff of foundry engineers maintained by Giffels & Vallet, Inc. is qualified to plan improved working conditions, better casting quality and decreased production cost. Foundry engineering services include: Preliminary Engineering and Final Design Engineering for complete projects, modernization or expansion programs. They make surveys, analyses and estimates; they consult, recommend and advise. These engineers are available to you now; they will gladly confer with you concerning your proposed plans.

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South American Foundry

BUILT UNDER HANDICAPS

By HERBERT J. BURRUS
Metallurgist
International Petroleum Co
Negritos, Peru

DESPITE the necessity of resorting entirely to materials and facilities available in the district, a new foundry for the production of steel, cast iron and bronze castings has recently been completed and placed in successful operation for the International Petroleum Co. at Negritos, Peru, a repair and fabricating center near the main port of Talara.

Melting equipment consists of an open-hearth furnace, two cupolas, a side-blown converter and two brass melting furnaces. Because of difficulty in importing refractories during the war, silica brick was made on the premises. Quartz rock was mined and crushed to a minus 1 in. A mixture composed of 150 lb of quartz, 50 lb of old brick bats, 2 lb lime, 2 lb of clay and ¾ pail of water was ground in a mill and molded by hand. After being dried in a furnace at 250 F the brick was placed in small furnaces holding 300 pieces and burned gradually by raising the temperature to 2400 F in 18 hours and holding it there for 6 hours, followed by slow cooling for 14 hours and faster cooling for 8 hours.

Many different sizes of brick were required, and it was convenient to be able to make any desired shape on the job as needed. The brick was found to have a melting point of about 3200 F. In all about 30,000 pieces were made. The quartz rock was obtained from a strong vein, 40 to 60 ft wide, which cuts through the company's property. It shows some mineralization, but as yet no workable ore deposits or ore shoots have been discovered in it. The clay also occurs on the company property, in the form of a large bed of kaolin clay 20 to 30 ft thick. The clay is relatively free from iron, is high in white color property and has a fine particle size.

The open-hearth furnace, shown in one of the accompanying illustrations, is the tilting type, steel encased, has a melting capacity of 5 tons and is fired with natural gas and low pressure air at about 1 psi. The tilting mechanism is operated by a 6-hp motor under a reduction of 600 to 1 and requires 45 seconds to move the furnace from the upright to pouring position. Furnace necks entering into each of the air uptakes are made with a brick flange and have a seal that provides free movement of air without allowing the

(*Concluded on page* 226)

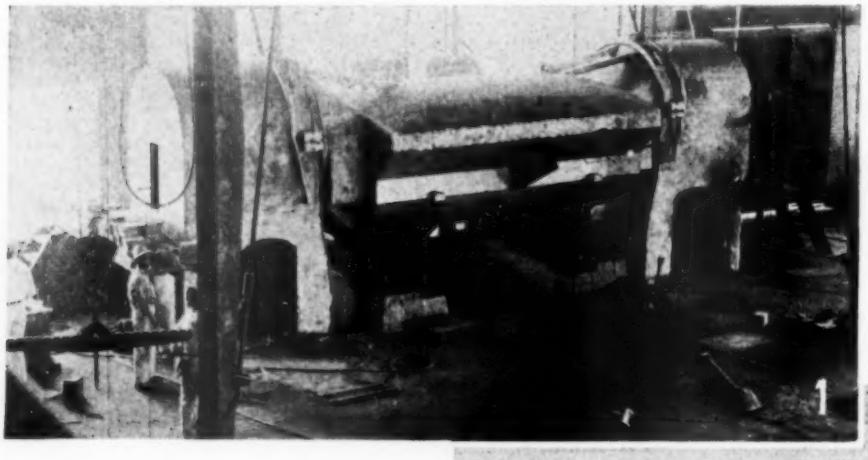

Fig. 1 — View of tilting open-hearth furnace from the pouring side. Note the two doors to slag pockets on each side

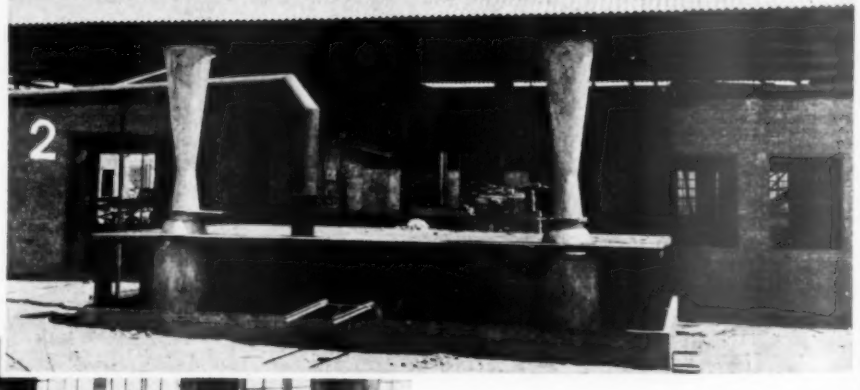

Fig. 2 — Open-hearth furnace and charging platform shown from the charging side

Fig. 3—Gas-fired brass furnaces and heat treating and annealing furnaces. Production includes manganese, phosphor, silicon and aluminum bronzes

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Patterns—
GUARANTEED TO SUIT YOUR FOUNDRY
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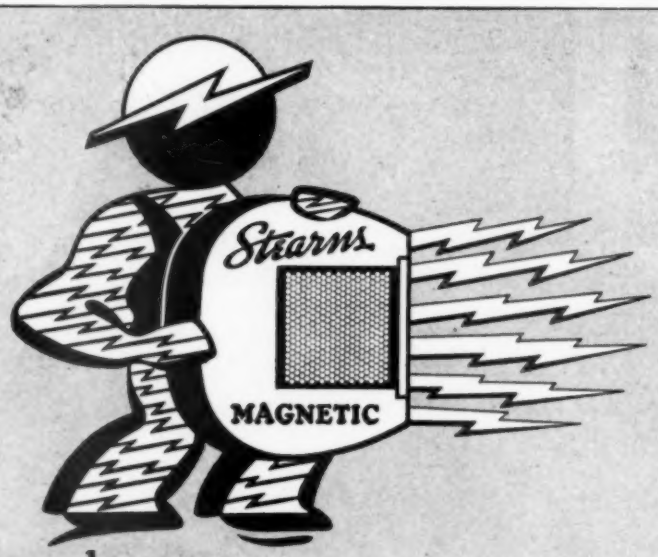
(*Concluded from page 224*)

flames to pass through. Furnace brick is of special shape and consists of 96 per cent silica, 2 per cent lime and 2 per cent alumina, iron and magnesia.

Melting time for a 5-ton charge is three to four hours. Close control is maintained over the air-gas ratio in order to have a reducing flame at all times. Because of the steel encasement no difficulty has been encountered from air infiltration, and the large draft obtainable through the venturi stacks more than takes care of air entering the doors or at the furnace necks. All of the roof brick is suspended both in the checkers and over the hearth by means of steel rods passing through the ends of the brick, while brick in walls of the uptakes and around the furnace neck and gas inlet is reinforced similarly. Cost of building the furnace was extremely low.

Brass furnaces also are fired with natural gas and each will melt 400 lb of metal every four hours. Production with these two units includes manganese, phosphor, silicon and aluminum bronzes. Cupola furnaces are used to make different types of cast iron, the charges varying from one containing no steel scrap to one made from 100 per cent steel. A common composition is 25 per cent iron scrap and 75 per cent steel. Sand castings weighing over 2 tons have been made with these cupolas.



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PLANNED LIGHTING FOR THE MODERN FOUNDRY

(*Continued from page 85*)

surface with a dry cloth had little effect on the dirt. A thorough cleaning was required to restore original efficiency and distribution.

In another test a closed type, 1000-watt unit was removed from a foundry after two-years' service. Fig. 3 shows the photometric results. The overall efficiency was reduced only 7 per cent, and the characteristic distribution was unchanged.

Layout for Lighting—Planning the layout necessitates consideration of a number of points such as spacing and location of luminaires, mounting height and method of mounting, and proper wiring and control of the system. Typical layouts are illustrated in Figs. 4, 5, 6 and 7.

When only incandescent lamps are used it is a general rule to install 500-w units up to 18 ft mounting height and 750-w or 1000-w units above 18 ft on symmetrical spacing (Fig. 4).

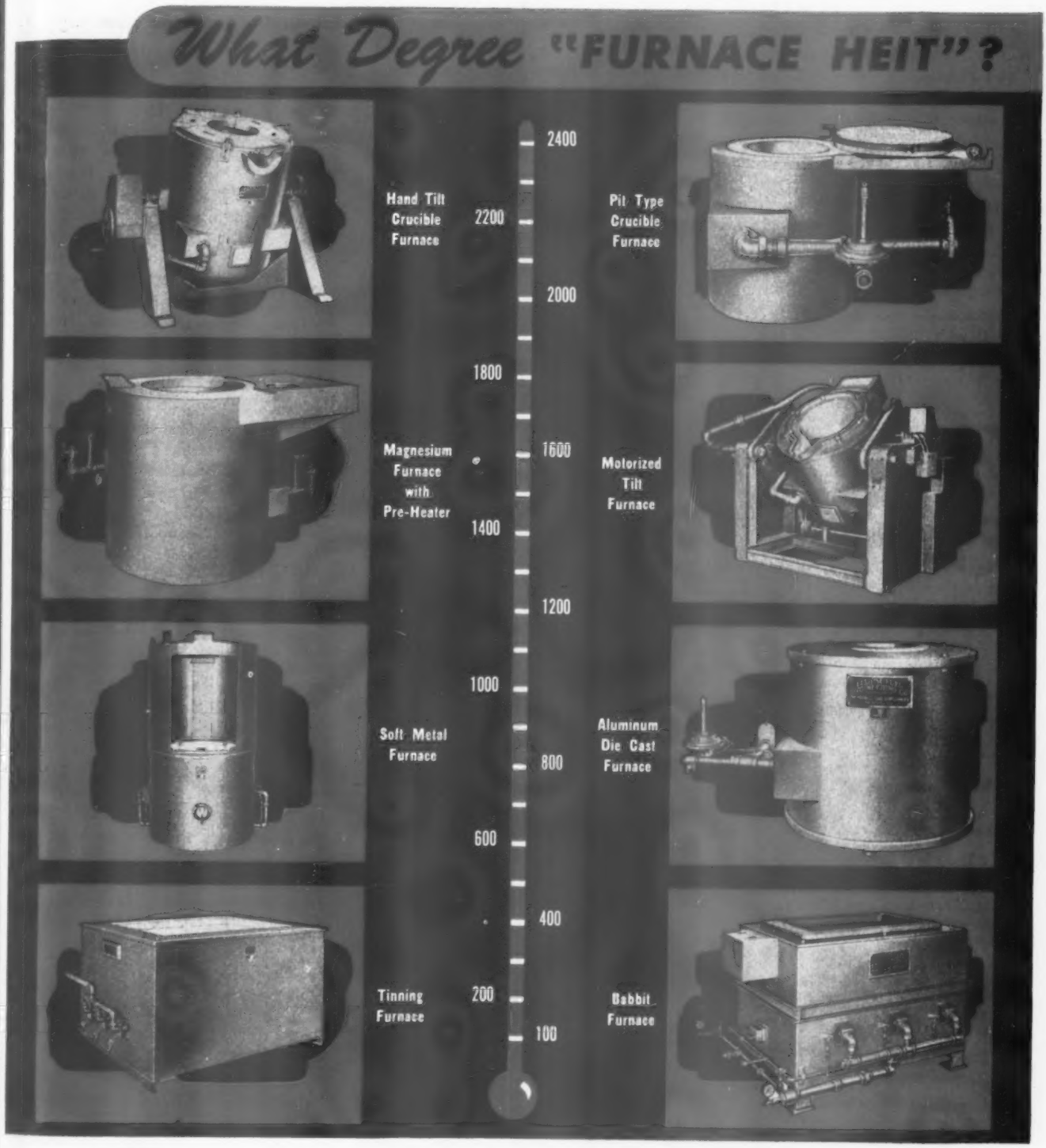
When incandescent and mercury lamps are used in staggered layouts, such as Fig. 5, the mounting height should be at least 25 or 30 ft to obtain a uniform color mix from the two sources. Another way of combining mercury and incandescent sources is in tandem mounting where a mercury reflector and an incandescent reflector are installed adjacent to each other (Fig. 6).

Another mercury source, the 3kw lamp, has definite advantages for foundry lighting if conditions are suitable. This long, tubular lamp has a light output equivalent to seven and one-half 400-watt mercury lamps or about six 1000-w incandescent lamps. It is truly a miniature sun. However, since it is very bright it should be used only at mounting heights of 40 ft or more and with a deep reflector that provides suitable shielding. The main advantage is that relatively few luminaires are required (Fig. 7), thus installation and maintenance costs are reduced. Transformers for the 3kw lamp are available for one or two lamps and for 230 or 460 v. The latter voltage is frequently used, taking the supply directly from a three-phase delta power feeder.

Often it is necessary to mount lumi-

(*Concluded on page 228*)

What Degree "FURNACE HEIT"?



Whether it's brass, bronze, magnesium, aluminum, tin, lead or a soft metal, a suitable Eclipse Melter can be selected for your requirements.

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ROCKFORD ILLINOIS

McKee Eclipse

(*Concluded from page 228*)

naires at considerable height in a foundry, and this means all branch circuits must be run to panelboards located on the columns at floor levels. These long runs can be eliminated completely by controlling luminaires by contactors mounted at the truss level. Therefore, it is only necessary to extend small conductors to the floor for remote control of the contactors. Several large installations using contactors have been made and are proving to be very satisfactory.

Maintenance—Maintenance should be planned with the lighting system, as luminaires must be readily accessible if they are to be serviced properly. For equipment mounted up to 18 ft above the floor, access from ladders or telescoping lifts is practical. For heights above 18 or 20 ft, access should be from a traveling crane or catwalk, or luminaires should be mounted on lowering hangers. To provide for convenient access may increase the initial cost slightly, but this additional investment will be quickly repaid through reduced maintenance labor costs.

Many applications of light in foundries require that the luminaires be mounted relatively close to the seeing tasks and arranged in direct relationship to the operation. Such an installation is called supplementary lighting. This application is particularly suitable for fluorescent lighting because of the reduced brightness and heat from the fluorescent lamps. However, it is advisable to install fluorescent luminaires with dust-tight covers to minimize the accumulation of dirt on the reflector and lamp. A few examples of supplementary lighting are cited in Figs. 8 to 12, inclusive.

The completely adequate foundry lighting system consists of general plus supplementary lighting balanced to suit the specific requirements. Thus, "Planned Lighting for the Modern Foundry" represents a complete system in which the seeing requirements, overall economy and maintenance are given careful consideration in developing the "plan."

They RESIST WARPAGE

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Transite Core Plates offer all these advantages:

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Transite Core Plate surfaces stay smooth even after long service. Warpage is less than 0.1%.

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Book Review

A Foundry Manual for the Man in the Shop: in four booklets with number of pages varying from 50 to 60; issued by the National Founders Association, 120 South La Salle Street, Chicago; 50 cents per copy.

This is the third reissue of a series of booklets on various phases of foundry operation—No. 1, "The Cupola"; No. 2, "Molding and Coremaking"; No. 3, "Nonferrous Foundry"; No. 4, "Cleaning Casting." Each one is an excellently boiled-down version of all the essential features. For example, the cupola manual discusses combustion, coke ratio, coke bed, air pressure, tuyere ratio, melting rate, semisteel, specific heat, physical properties and tests, calculating mixes, alloying elements arranged in groups, melting loss, melting points of iron and steel, preparing the cupola, making up the bottom, making up the bed and lighting the cupola, soaking time, carbon pickup, slagging the cupola, judging operation by appearance of the slag, daubing, glossary of terms.

Subjects treated in No. 2 on molding and coremaking include molding sand, blending and mixing, percentage of new sand for facing, facing mixtures, clays for foundry use, result of physical and chemical tests on clay, sea coal in molding sand, blackings, ramming a mold, the vent wire, gating and pouring, bench molding, coremaking, mixes and binders, specifications for core oil, core sand mixes, magnesium, casting defects—causes and remedies, foundry hints, items an apprentice should know and remember, glossary. The books really are remarkable examples of how the vast field of knowledge can be presented in concentrated form.

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Davenport jolt squeezers are built to take the punch on your floor.

Here are only a few of the outstanding features that make Davenport squeezers RUGGED:

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3. **LARGE DIAMETER THREADED ADJUSTING SHAFT** for durability and rapid adjustment.
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Davenport Jolt Squeeze
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SUPPLY AND DEMAND FOR FOUNDRY ENGINEERS

(*Continued from page* 111)

of those problems to be encountered by the foundry engineer.

Other industries interview and select prospective engineers months before graduation. It behooves foundries to make their selection in good time or else the most ambitious and most progressive men will have been chosen, leaving only the less desirable men. It is too idealistic to expect the prospective foundryman to pass up employment opportunities coming to the college campus from other companies in the hope that he can secure foundry employment after graduation, especially if he has no indication that foundries need engineers at the time other industries are seeking such services.

It should require little effort for the foundry employer to sell to the student the opportunities in the foundry and the fascinating business of making castings; the many engineering procedures used; the control of materials and equipment; and finally the conversion of a ladle of molten metal to an intricate casting for the industries served by that foundry.

The desire on the part of a student to become a foundry engineer is lost if foundries do not show adequate interest in seeking the young man's services, and if the foundry that has employed him does not properly assist him in the transition from academic to industrial thinking.

The hiring of a young engineering graduate is merely the beginning of making a foundry engineer. The complete process requires careful training of the academic mind to practical thinking in industry's ways, and to point out the problems a foundry has with the melting procedures, the molding sands, the molding methods, handling men, etc. This procedure of training these engineers is carried on in most other industries. Those companies that have the best reputation among students and seem the most desirable employers are generally those which have carefully planned courses involving from six months to two years of industrial training.

Training Is Investment

An engineer is an investment which increases in value in direct proportion to the time and effort spent by the management in training him in the way he should go. Someone in the company should be held responsible for the plant training program for one man or for a group of men — someone who is a father confessor, who can answer his questions, and who sees how his talents can be used to the best advantage, whether in personnel work, on the foundry floor, planning and scheduling, technical problems, etc. A young man given such a training soon develops loyalty and responsibility of high value to the foundry.

Once foundries have demonstrated to schools and colleges that they want these young men, by going after them and by carefully training them in industry, their reputation will be such that it will become successively easier to produce engineers in the years to follow. This is actually showing students, in deed rather than in word, that the foundry is an agressive industry, conscious of its need to keep pace with industrial progress. The foundry has then created a demand which can be supplied from an annual pool of America's best young talent. Since it is the record of engineering colleges to supply the demands of an industry for engineering talent, there need be no fear they will not do the same for foundries.

Foundries, therefore, should first demonstrate they want young engineers by actively seeking their services, and then develop them into foundry engi-

(*Concluded on page* 232)

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Fine Silica Sands

CORE BOXES LAST LONGER
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We have specialized for years in processing washed and dried white silica sand for all foundry purposes . . . especially in the finer meshes for use in core blowing.

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Ideal for the production of high quality light metal castings.

We also produce washed, dried and screened white silica sand in the coarser grain sizes for all foundry purposes, including coarse blasting sand . . . . and are the largest producers of SILICA FLOUR in the Central West.

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The
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Operating view
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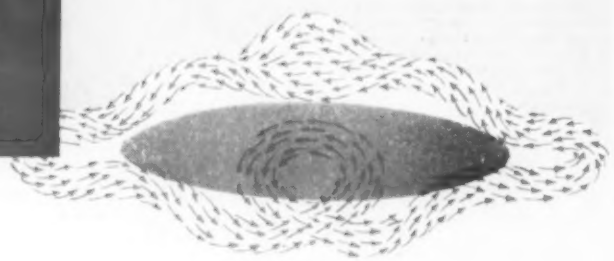

Whenever your sand mixer is in operation, you are paying for time and power. Therefore the economical mixer is the one which mixes during the entire operating time. Clearfield Mixers' continuous action, a principle based on the use of a revolving pan which keeps the sand in constant motion by centrifugal force, is the answer to your sand preparation problems. With a Clearfield mixer there are no alternate periods of action and inaction.

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CLEARFIELD
MIXER
MIXES - TEMPERS
AERATES

CLEARFIELD
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CLEARFIELD
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(*Concluded from page 230*)

neers by careful plant training. It will follow that engineering colleges will supply graduates for foundries by giving them the training in engineering fundamentals, and by the faculty urging and inspiring them to seek foundry employment.

The foundry industry realizes beyond a doubt that its progressive destinies are assured only in the proportion that young men of high ability are employed and developed, and upon whom can be placed the responsibility of keeping pace with industrial progress.

Disabled Persons Are Efficient Workers

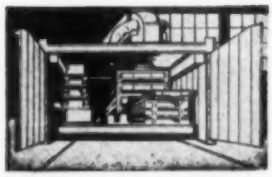
Production efficiency of disabled workers, veterans and non-veterans, is 2 per cent better than that of able bodied workers, according to a survey made by the Bureau of Labor Statistics of the U. S. Department of Labor at the request of the Veterans Administration. The survey, conducted during the first six months of 1946, covered 4000 physically handicapped and 6400 able-bodied workers in 47 firms located in seven highly industrialized states.

The survey also showed that disabled workers experienced one-third fewer serious accidents than able-bodied workers exposed to identical work hazards. Minor injury frequency rates, however, are slightly higher for impaired workers. Lost time on the job was the same for both groups, being 3.8 days per 100 scheduled work days.

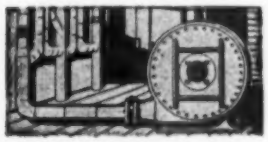
The fact that during the survey period four out of five disabled veterans applying for jobs at public employment offices were not placed indicates that employers are passing up a source of efficient manpower. The handicapped worker, hired for cold dollars-and-cents reasons, not sentimentality or patriotism, has proved to be a better business investment than his able-bodied coworker, the survey indicates.

President Truman has designated the week of Oct. 6 to 12 as "National Employ the Handicapped" week.

STOP GRINDER DUST!

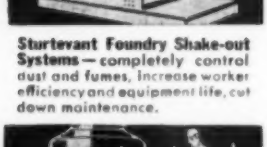


Sturtevant Core Oven Fans—handle dirty, dust-laden air with no loss in efficiency. Shafts cooled by special "heat-slinger."

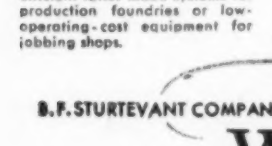


Sturtevant Compressors—hold air pressure constant, in supplying blast to oil or gas burners. Lifetime efficiency, minimum maintenance; worthwhile power savings.

Sturtevant Cupola Blowers—assure smooth, constant pressure supply of air. Compact, simple, sturdy construction; sizes and types for all conditions.

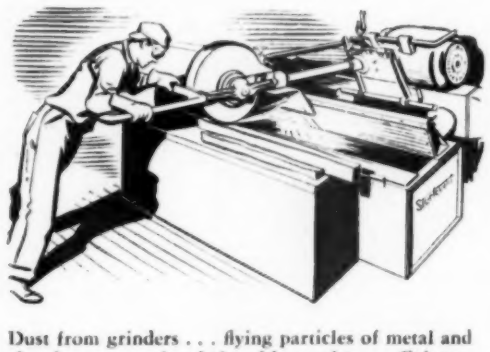


Sturtevant Foundry Shake-out Systems—completely control dust and fumes, increase worker efficiency and equipment life, cut down maintenance.



Sturtevant Fume Control—efficient tailor-made systems for production foundries or low-operating-cost equipment for jobbing shops.

How Sturtevant Dust Control System Eliminates a Foundry Health Hazard



Dust from grinders . . . flying particles of metal and abrasives . . . play hob with employee efficiency, health and morale. But *not* when a Sturtevant Dust Removal system like that shown here is in operation.

Installed in the swing grinder room of a prominent metal-working plant, the system removes light dusts through headers at each wheel. Heavier particles are collected in boxes below the wheels. So completely is dust collected that dust masks are unnecessary. Result reported: production up, labor turn-over markedly cut.

Wherever air can help in a foundry . . . dust and fume control, furnace blast, cupola blowers, core ovens . . . you'll find leading plants are using "engineered air" by Sturtevant. For full details on equipment or systems engineered to meet your specific needs, call in a Sturtevant engineer. No obligation, of course. Simply write the Sturtevant Branch Office nearest you or: B. F. STURTEVANT COMPANY, *Division of Westinghouse Electric*, Hyde Park, Boston 36, Massachusetts.

STURTEVANT PRODUCTS
DESIGNED TO MEET YOUR FOUNDRY NEEDS

Sturtevant
Puts Air to Work

B. F. STURTEVANT COMPANY • DIVISION OF
Westinghouse ELECTRIC

Iowa U. Offers Course In Quality Control

An intensive ten-day course in "Quality Control by Statistical Methods" starting Oct. 15, has been announced by the University of Iowa, Iowa City, Iowa. These methods were developed by some of the nation's leading industries with the co-operation of the Army and Navy and other governmental agencies. A feature of the proposed course is the follow-up program in which two two-day clinics will be held with the industrial representatives to discuss common problems and to obtain additional information.

One of the fundamental principles of quality control by statistical methods is to undertake to build quality into the product by keeping the various steps in the process within control. The program consists of a series of conferences, lectures and laboratory perods daily except Sunday. Tuition for the course including books and supplies, is $100. This is the fourth course offered by the university.

Film Tells Story of Castings

Meehanite Metal Corp., Pershing Square building, New Rochelle, N. Y., has available for use by interested societies or groups, a motion picture entitled "Meehanite Means Better Castings." The film, in black and white, for 16 mm. projection with sound, gives a comprehensive story of the engineering characteristics of castings and their industrial applications. Prints will be loaned upon request.

cores 20% stronger

WITH "CUSTOM-MADE" CORE OIL

You want results like this, but *your* problem is different. That's just where the Swan-Finch service engineer comes in! His job is to get to the bottom of that difference — get the best solution to *your* binder problem. And he does. That's why our files bulge with cases where *individually recommended* Swan-Finch core oils far out-performed binders bought "cold" — without a thorough investigation of conditions.

Behind every Swan-Finch man is Swan-Finch experience — 90 years of it — and long familiarity with most foundry conditions, practices and binder properties. It will pay you to let a Swan-Finch man spend a short while in *your* plant. There's no cost, no obligation — *no interruption of production.* Coupon below brings him.

SWAN-FINCH CASE HISTORY No. XX

Product:	Gray Iron Castings
Cores Size:	Small to 150 lbs.
Ratio of sand to binder in core mix:	With 2 original core oils — 40 to 1 With S-F core oil — 50 to 1
TESTED STRENGTH OF CORES:	Increase in core strength with S-F core oil — 20%
EXTRA Benefits:	Harder core surfaces, sharper edges. Breakage in handling lowered. Shake-out time cut. Cleaning time cut to minimum.

1931

INDUSTRIAL PRODUCTS

SWAN-FINCH OIL CORPORATION

R.C.A. Building West, New York 20, N. Y.

Please send a Swan-Finch engineer to our plant.

Name_____

Company_____

Address_____

City_____ State_____

Industry BRIEFS

WELLS Mfg. Co., 1856 Miner St., Des Plaines, Ill., a newly formed corporation, has acquired the entire business, personnel and facilities of the Chicago Foundry Co.'s plant "B" of that address. This change does not affect plant "A" of the Chicago Foundry Co. in Chicago. Wells Mfg. Co. also expects to have in operation about the first of the year a new plant in Skokie, Ill.

• • •

American Manganese Steel Division, American Brake Shoe Co., Fourth and Wazee St., Denver, has been cited by the Colorado state industrial commission for completing a year without a lost-time accident.

• • •

Koppers Co. Inc. has purchased the Defense Plant Corp. property and equipment adjacent to its American Hammered Piston Ring Division plant, Bush and Hamburg St., South Baltimore. It will be used for production of automotive piston rings. Koppers made aircraft piston rings in the plant during the war, and since that time has rented and used it for producing automotive piston rings.

• • •

Gas Atmospheres Inc., 20011 West Lake Rd., Cleveland 16, recently organized, is engaged in the design, manufacture and sale of equipment and processes to produce industrial gas atmospheres—deoxidizing, carburizing, malleablizing, inerts, nitrogen, hydrogen, dissociated ammonia. A. A. Straub is president and general manager.

• • •

. Spring City Foundry division of Grede Foundries, Waukesha, Wis, suffered fire loss of several thousand dollars recently due to an overheated oven.

• • •

Crucible Steel Castings Co., Milwaukee, has leased for five years from War Assets Administration the Milwaukee casting plant operated by Crucible during the war.

• • •

G. S. Blodgett Co. Inc., Burlington, Vt., producer of core ovens, has formed an export division, 11 West 42nd St., New York, under the management of Richard Eisenmann Export Co.

• • •

The recently formed Inland Gray Iron Foundry Inc., Watertown, Wis., is constructing a new foundry building, 80 x 120 ft. The work is in charge of engineer Arthur Kuenzl, Watertown.

• • •

Commercial Pattern Works, 635 South Russell St., Indianapolis, recently organized by Oscar Anderson and James Scott, will manufacture all types of wood and metal patterns.

• • •

Oliver Farm Equipment Corp. has completed modernization of its South Bend, Ind., foundry. Improvements includes installation of conveyors, overhead operated ladles, and sand slingers.

• • •

Gray iron castipg production for July in the Philadelphia Federal Reserve district dropped 6.7 per cent below that of June but was 14.3 per cent above that of July, 1945, according to the University of Pennsylvania's Industrial Research Department. Malleable iron production rose 42.4 per cent over June

(*Continued on page 236*)

NEW STEEL FOUNDRY: Harvey W. Kutchera (left) and John McBroom, partners in the recently organized Stainless Steel & Engineering Co., 5132 North 35th St., Milwaukee, are shown inspecting work on the electric arc furnace they designed. Milwaukee Journal photo.

IT'S AS SIMPLE AS A-B-C

to produce GOOD CASTINGS when you use JISCO BLAST FURNACE SILVERY

HIGH SILICON IRON
JISCO

The addition of JISCO Blast Furnace Silvery enables the Foundryman to use gray iron, malleable iron and steel scrap in his charges with definite assurance of metallurgically sound, uniform castings.

JISCO Silvery supplies the needed silicon. It allows the use of the proper scrap to secure the desired carbon content, yielding castings that are tough, close grained and easily machined.

JISCO Silvery definitely simplifies and improves foundry operation, with resultant greater satisfaction to yourself and to your customers.

We shall be glad to give you complete information

From a message by Andrew Jackson to the Congress: "Nor is our government to be maintained, or our Union preserved, by invasions of the rights and powers of the several states. In thus attempting to make our general government strong, we make it weak."

THE JACKSON IRON & STEEL Company
JACKSON, OHIO.

(*Continued from page* 234)

and 134.9 per cent over July, 1945. Shipments and unfilled orders for iron foundries were all higher than a year ago. All raw material supplies were lower than at the end of June; pig iron supplies were less than in July, 1945, but scrap iron and coke stocks were greater. Steel casting production in July declined 4.1 per cent from June and 26 per cent from July, 1945.

* * *

International Nickel Co., New York, has opened a technical section of its Development and Research Division, in the Bankers Mortgage Bldg., Houston, Texas. Under the direction of R. J. Rice, technical assistance will be furnished to industry in Texas, Oklahoma, Louisiana, Mississippi and the southern half of Arkansas.

* * *

Verson All Steel Press Co., 1355 East 93rd St., Chicago, has let contract to Norman Bouchard, Wester Springs, Ill., for a one-story 100 x 156 ft foundry building to cost about $85,000.

* * *

Acme Foundry Co., 2503 22nd St., Detroit, has let contract to Bennage & McKinstrie Co., 4612 Woodward Ave., Detroit, for a foundry building costing about $85,000.

* * *

Shank Aluminum & Brass Casting Co., 1281 30th St., Oakland, Calif., suffered $50,000-$100,000 loss in a fire, ignited in the pattern room by an unattached stovepipe.

* * *

Parr-Richmond Terminal Corp., 1 Drumm St., San Francisco, will build a new foundry, office, warehouse, shower and locker building at Richmond, Calif., costing $250,000. E. L. Bloomster, 116 New Montgomery St., San Francisco, is consulting engineer.

* * *

Chain Belt Co., 1600 West Bruce St., Milwaukee, has purchased the heavy ordnance plant constructed in 1943 for the Defense Plant Corp., West Milwaukee. Present plans call for its use in the manufacture of chain belts and some construction machinery.

* * *

Pullman-Standard Car Mfg. Co., has closed its Hammond, Ind., plant. Work formerly done there will be taken over by the company's plant in Michigan City, Ind., where a new building is being constructed and scheduled to begin operation early in 1947.

* * *

International Harvester Co., Chicago, plans to include a foundry in its recently opened plant in Evansville, Ind. International now makes commercial refrigeration machinery in this plant which was acquired from Republic Aviation Corp. Foundry operations are expected to start about next Jan. 1.

* * *

The recently completed gray iron Foundry of Fountain Foundry Co., Veedersburg, Ind., is specializing in range parts for the Chambers Stove Corp., Shelbyville, Ind.

* * *

Hirschheimer Foundry Co., La Crosse, Wis., has been incorporated by Mary Svec, Bernice Kaufman and Robert Hirschheimer to operate a general foundry and machine shop.

* * *

Roura Iron Works, 1404 Woodland Ave., Detroit, is building a 35 x 110 ft addition to its plant to provide additional capacity for steel fabricating.

* * *

Midway Foundry, 3136 Rosecrans Ave., Hawthorne, Calif. has begun construction of a new iron foundry at 18073 South Main St., Los Angeles, to provide 2551 sq ft of floor space, and to cost approximately $10,000.

* * *

Midway Brass Foundry, Rockton, Ill. has been formed by Ray Bennett and G.

There's a stock of

SCHUNDLER BENTONITE

near your plant

From any one of the locations shown below . . . you can get prompt shipments of Schundler Bentonite . . . a first quality foundry Bentonite.

Akron, Ohio	Stoller Chemical Co.
Birmingham, Ala	Foundry Service Co.
Boston, Mass	Klein-Farris Co., Inc.
Buffalo, N. Y.	Weaver Materiel Service
Chattanooga, Tenn.	Robbins Equipment Company
Chicago, Ill.	Foundry Supplies Co.
Chicago, Ill.	B. J. Steelman
Chicago, Ill.	Wehenn Abrasive Co.
Cincinnati, Ohio	Delhi Foundry Sand Co.
Coldwater, Mich.	The Foundries Materials Co.
Detroit, Mich.	The Foundries Materials Co.
Dallas, Texas	Barada & Page, Inc.
Edwardsville, Ill.	Midwest Foundry Supply Co.
Hammond, Ind.	The Foundries Materials Co.
Houston, Texas	Barada & Page, Inc.
Kansas City, Mo.	Barada & Page, Inc.
Long Island City, N.Y.	F. E. Schundler & Co., Inc.
Los Angeles, Calif.	Ind. Fdy. Supply Co.
Los Angeles, Calif.	F. E. Schundler Bentonite Co. (Inc. of California)
Milwaukee, Wis.	Thomas H. Gregg Co
Minneapolis, Minn.	Smith-Sharpe Co
Moline, Ill.	Marthens Company
New Orleans, La	Barada & Page, Inc.
Oklahoma City, Okla.	Barada & Page, Inc.
Philadelphia, Pa.	Penna. Fdy. Sup. & Sand Co.
Portland, Ore.	Miller & Zehrung Chemical Co.
St. Louis, Mo.	Midwest Foundry Supply Co.
San Francisco, Calif.	Ind. Fdry. Supply Co.
Seattle, Wash.	Carl F. Miller Co.
Tulsa, Okla.	Barada & Page, Inc.
Wichita, Kans.	Barada & Page, Inc.
Mexico D. F., Mexico	N. S. Covacevich
Montreal, Quebec, Canada— (All Provinces)	Canadian Industries, Ltd.

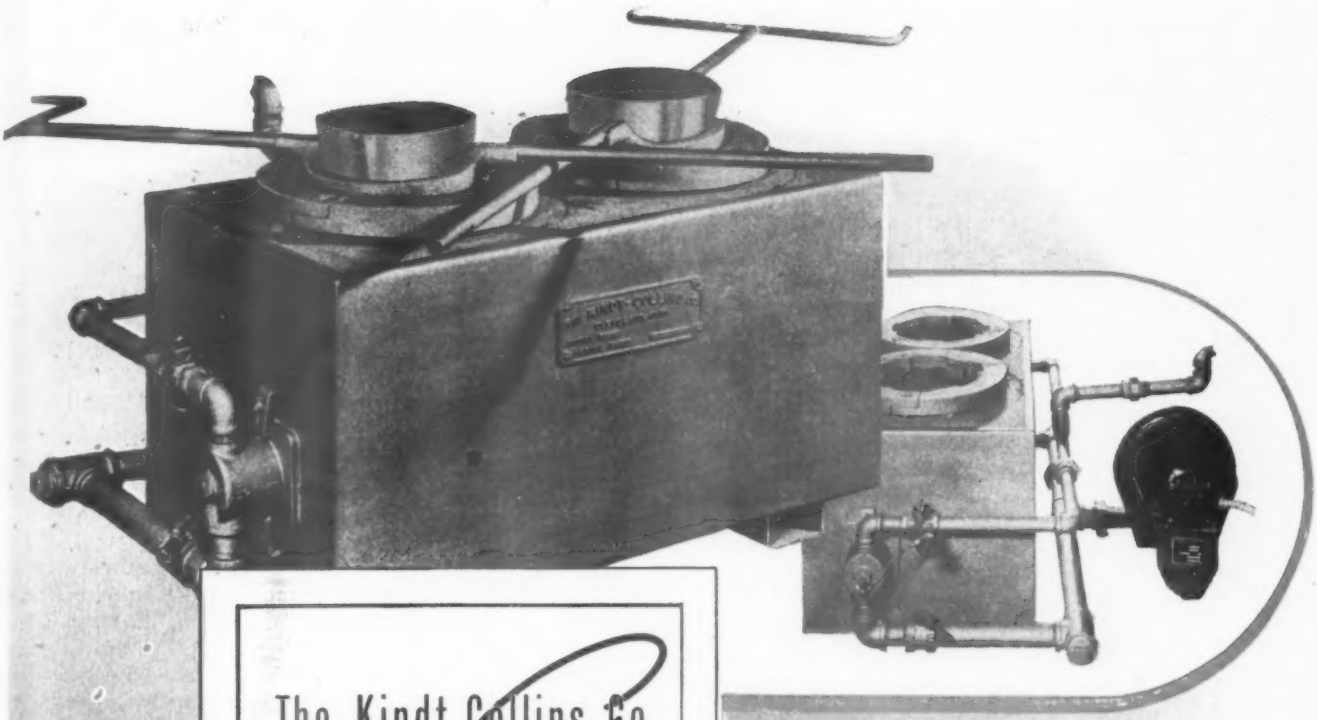
Muir Foundry Supplies, Ltd. . . . . Toronto, Ontario, Canada

F. E. SCHUNDLER & CO., INC.

520 RAILROAD STREET • JOLIET, ILLINOIS

SCHUNDLER

BENTONITE



The Kindt-Collins Co. *Announces* ITS NEW LINE OF

MASTER Aluminum MELTING FURNACES

GAS OR OIL FIRED . . . FOR MEDIUM REQUIREMENTS

These newly designed, highly efficient furnaces are now available to meet the requirements of pattern shops, schools, smaller foundries, supplemental equipment for large foundries, and for other plants with moderate production.

This is a typical Kindt-Collins finely-engineered job—simple in design, highly utilitarian, and sturdily built for long, low-cost service. Note these important features:

- **Aluminum can be melted in and poured directly from the heat-resisting alloy metal pot. This minimizes agitation and resultant porosity.**
- **The pots can withstand more than 100 heats when used with reasonable care. They are designed to keep gases away from the surface of the molten metal.**
- **Fuel and air adjustments are easily made.**
- **Quick melting with low fuel consumption.**
- **The furnaces are adequately insulated to assure maximum heat. The most efficient type of refractory linings are used.**
- **Pilot-equipped for quick and easy starting.**
- **Completely equipped with bales, pots, motor, blower, etc.**
- **Available in single units of 50 lb. capacity or double units of 100 lb. capacity.**
- **Can be equipped for the occasional melting of brass.**

For more profitable production in your plant, write for full details and prices of the New Master Aluminum and Brass Melting Furnaces.

THE KINDT-COLLINS COMPANY

"Everything for the Pattern Shop"

12651 ELMWOOD AVENUE, CLEVELAND 11, OHIO

KINDT-COLLINS MASTER PRODUCTS

(*Continued from page 236*)

W. Akerlow, Beloit, Wis., for the production of small nonferrous castings. Mr. Bennett has been a metallurgist for several Freeport, Ill. foundries, and Mr. Akerlow formerly was associated with Fairbanks, Morse & Co., Chicago, and Beloit Foundry Co.

• • •

Elematic Equipment Corp., formerly located at 6046 South Wentworth Ave., Chicago, has moved into larger quarters at 1150 West Marquette Rd., Chicago.

• • •

American Radiator & Standard Corp., 1089 Essex St., Richmond, Calif., plans construction of a foundry on property acquired from the Parr-Richmond Terminal Corp. and adjoining the radiator company's present plant on Crichett Ave., Richmond. The new plant will produce 6,500,000 lb of finished brass products annually.

• • •

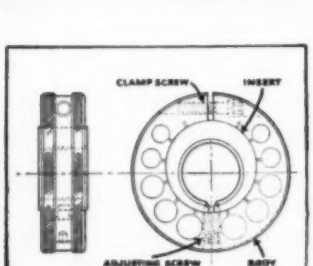
Lakeside Melting & Refining Co., Chicago and Detroit, recently organized $100,000 capital, has acquired the plant and site of the former Wanner Malleable Castings Co., Hammond, Ind., which was abandoned in 1931.

New Thread Ring Gage Starts Round Stays Round With Every Adjustment!

Employing a new principle of design, the Woodworth Thread Ring Gage closes in round within .0002 maximum after .005 adjustment. It offers greater accuracy and stability since size adjustment is controlled along thread helix angle. Threads are held securely in alignment after adjustment, due to unique adjustment means. Wear is distributed over full circumference for all resettings, thus increasing life of gage.

Positive adjustment makes it almost impossible to change setting with ordinary knocks. Positive identification by a green "go" gage and red "not go" gage saves operator time. Aluminum alloy outer body cuts weight in half, to reduce operator fatigue and increase sensitivity.

To also reduce fatigue on precision jobs, many plant owners make chewing gum available for workers. Tests show that the act of chewing aids in relieving tension, which is often the cause of fatigue. These tests further reveal that chewing Wrigley's Spearmint Gum, for instance, helps workers stay alert, thus increases their efficiency to do more accurate work.



Woodworth Thread Ring Gage

You can get complete information from
N. A. Woodworth Company
1300 East Nine Mile Road, Detroit 20, Michigan

AA-93

United States Rubber Co., New York, through use of its recently acquired government plant in Ft. Wayne, Ind., plans to triple production of high-speed rubber and synthetic resin bonded grinding wheels used by foundries, steel mills and metal fabricating plants.

• • •

Maco Aluminum Foundry, affiliate of Majestic Co., Huntington, Ind., is again producing permanent-mold aluminum kitchen utensils after rebuilding the foundry building which burned recently.

• • •

The recently opened Hoagland Foundry, Hoagland, Ind., operated by Albert Barr and associates, is producing aluminum and brass castings on a job work basis.

• • •

General Electric Co., Schenectady, N. Y., has purchased the Kunkle Valve & Foundry Co. building, 121 South Clinton St., Ft. Wayne, Ind. The latter discontinued production of bronze and aluminum castings on Sept. 1.

• • •

Coremakers Inc., formerly located at 1811 W. Carroll Ave., Chicago, has moved to 4435 W. Division St., Chicago 51. Former capacity has been more than doubled by installation of new and modern oven and handling equipment.

• • •

Mountain City Foundry & Machine Co., 200 South Academy St., Greenville, S. C., will build additions costing about $100,000 and increasing floor space from 10,000 to 75,000 sq ft.

• • •

Sales of foundry equipment in July represented 453.4 per cent of the 1937-1939 monthly average, according to the Foundry Equipment Manufacturers Association. This compares with 491.7 per cent in June and 411.7 per cent in July 1945.

• • •

Mattison Machine Works, Rockford, Ill., suffered fire loss estimated at $300,000 when four connecting company buildings and a company owned 20-apartment building were destroyed.

• • •

J. I. Case Co., Racine, Wis., will add 6000 sq ft to the foundry and improvements to the casting unit of its tractor and farm equipment plant in Rock Island, Ill., as part of a $3,000,000 modernization and expansion program.

• • •

Budd Wheel Mfg. Co., 12141 Charlevoix Ave., Detroit, plans a foundry plant addition, to cost about $95,000.

• • •

Buffalo Cooperative Stove Co. has changed its name to Amherst Foundry Inc. There is no change in corporate

(*Concluded on page 240*)

NOW AVAILABLE TO EVERY FOUNDRY

MINCO BOND

LET'S TAKE THE TROUBLES OUT OF FOUNDRY SAND

Let us pause in our sales of MINCO BOND, to take the troubles, and the loss, and the unknown elements out of FOUNDRY SAND PRACTICE.

Approached from the ground floor, FOUNDRY SAND PRACTICE is as simple as the first, second and third grades in school, but if approached from any other angle, it is as complicated as a college degree, and a person should have a crystal ball and a ouija board before tackling it.

If we could pour all our castings in a good sharp sand mold, we would have no troubles, but, unfortunately, we cannot do this, so we bond our sharp sand together with various bonding agents and, if the sand and the bond are good, a good casting is the result.

In any other art or trade that should be the end of trouble and each succeeding casting if made with the same sand should be a good one. However, in foundry sand practice, the first perfect sand does not stay that way long. At each handling, ramming, pouring and shake out,—each heat and chill creates an ever changing physical condition in the sand and bond. The sand grains are always breaking up and changing in structure the bond accumulates in small vitrified particles and there comes a day when the sand grains become so changed that there is no longer any room for the sand to telescope itself or shrink closer together when expanded by the terrific heat of pouring temperatures. The mold is held secure and tight in its flask, the surface sand cannot retreat into the tight backing sand and there is nothing it can do but push up into the molten metal, when the heat expands it. This results in a "cut" or a "buckle" or "rat tail".

This "buckle", "cut", and "rat tail" was one of the first troubles encountered when ancient man made his crude copper, and, later, bronze castings. The Chinese were pouring castings almost at the time of our "Garden of Eden".

In our early days in FOUNDRY SAND PRACTICE, the practice was to waste this sand, which had begun to buckle and start with a new sand, which they hoped would not buckle. If results were favorable everybody was happy until the sand buckled again when the sand had to be changed all over again. However, it was not always possible to get new sand which would not buckle and various methods and devices were used to avoid this trouble. Slowly it was discovered that a material like a grain flour, saw dust, pulverized bituminous coal, or any substance that would burn out when in contact with pouring temperatures would bring freedom from buckle, cut, and rat tail, if mixed with the sand.

To cure buckle, cut or rat tail in iron practice:

Large castings—chunky and heavy, use cereal binder. Use enough to eradicate the condition.

For smaller castings and large thin castings, use sea coal. Use enough to eradicate the buckle or cut. Usually a ten sand to one sea coal will cure it, but it has been necessary to go to eight to one to get relief.

Where thin, long castings have a tendency to misrun or cold shut, use wood flour instead of sea coal. Use enough to eradicate the cut or buckle.

An excellent facing for Green or Dry Sand work in Iron Foundries, that is, Malleable or Grey Iron:

All burned sand
Two parts Minco Bond
One part Western Bentonite
Ten parts sand to one part Sea Coal.

Use enough, more or less, of the bonds given above and in this proportion to get approximately 8 lbs. Green Compression Strength.

Moisture Green Sand 3.5% to 4.5%.
Moisture Dry Sand 5.5% to 7.5%.

The use of this facing simplifies your work. Just increase the moisture for Dry Sand work. You will have a hard mold when dried, free of cracks, and which will shake out clean and free of lumps.

In our next ad we will "TAKE THE HOLES OUT OF CASTINGS".

Write for our booklet.

MINCO PRODUCTS CORPORATION

SAGINAW, MICHIGAN

WARNER H. THOMPSON CO.
7338 Hamilton Ave., Detroit, Mich.

THE BUCKEYE PRODUCTS CO.
7629-34 Vine St., Cincinnati, Ohio

MARTHENS COMPANY
1395—4th Ave., Moline, Ill.

FOUNDRY SUPPLIES CO.
421 W. 23rd St., Chicago, Ill.

THE HOFFMAN FOUNDRY SUPPLY CO.
1393 Main, Cleveland, Ohio

THE FOUNDRY SUPPLY CO., INC.
2295 University Ave., St. Paul, Minnesota

WOLVERINE FOUNDRY SUPPLY CO.
2211 Bellevue, Detroit, Mich.

W. H. BARNES COMPANY, Ltd., 241 Cumberland Ave., Hamilton, Ont.

MOLDEN Ltd., 361 Murray St., Montreal, Quebec

SHANAHAN'S LIMITED, Vancouver, British Columbia

SHANAHAN'S LIMITED, Winnipeg, Manitoba

INDUSTRIAL FOUNDRY SUPPLY CO., Inc., San Francisco, Calif.

INTERSTATE SUPPLY & EQUIPMENT CO.
507 W. Virginia St., Milwaukee, Wisconsin

INDEPENDENT FOUNDRY SUPPLY CO.
2338 East 38th St., Los Angeles, Calif.

CONSET PRODUCTS CORPORATION
420 Madison Ave., New York, N. Y.

(*Concluded from page 238*)

structure or management. Foundry is located at 204 Amherst St., Buffalo.

* * *

Allied Castings Co. is the firm name under which Clayton D. Faust has published a certificate that he is conducting business at 11901 South Alameda St., Los Angeles.

* * *

An addition to the foundry building at 3447 East Pico St., Los Angeles, is being erected for R. W. Adair. Estimated cost of the structure, 25 x 35 ft. is $2000.

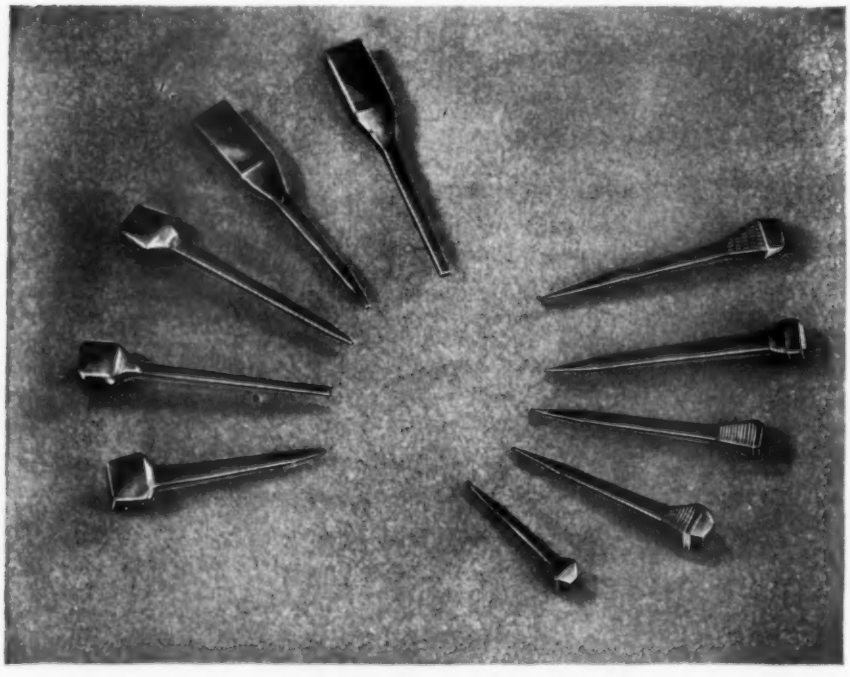
McGill Mfg. Co., Valparaiso, Ind., manufacturer of bearings, will close its castings division about Nov. 1. The foundry will be operated independently by new owners as a jobbing shop.

* * *

Permanent-Mold Casting Co., 2140 North Montcalm St., Indianapolis, has been re-named Mold-Cast Alloys Corp. The firm specializes in permanent and sand molding.

* * *

Stone Aluminum Foundry Co., 6811 Salt Lake Ave., Bell, Calif., suffered a $13,000 fire loss July 26.



SEND FOR SAMPLES

of MOLDOCHIL SHARP POINTED CHILL NAILS

Special Nails for Each Job — All at Regular Prices

Try, for instance, the sharp-point Jumbo Head and see for yourself how you eliminate the danger of breaking the sand core. Note that you have a choice of either sharp points or regular blunt ends — also slim, extra slim or regular blades. Examine the complete Moldochil line — with the right nail for each spot. Write for samples.

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Cut Costs and Cut Time with CAPEWELL HACK SAW BLADES

Faster cutting and longer lasting blades — thanks to Capewell's improved method of heat treating. Test them on your toughest job and prove to yourself that these blades are unsurpassed for cutting efficiency.

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Issues Management Bulletins

American Management Association, 330 West 42nd St., New York 18, has published a series of bulletins pertaining to various phases of plant management, available at the prices indicated. "Top Management Policies and Philosophy", "Company Development and Top Management Control", and "Executive Compensation and Accomplishment" are obtainable at 75 cents each. "Management Planning for Employment Stabilization" is priced at 50 cents, "Control of Salary Expense" at 35 cents, and "Management the Simple Way" at 15 cents. "Ten Commandments of Good Organization", suitable for office display and printed on a single sheet, costs 15 cents per copy.

Book Review

Foundry Process Control Procedures (Ferrous), paper, 145 pages 8½ x 11 in., published by Special Publications Dept., Society of Automotive Engineers Inc., 29 West 39th St., New York. Price $1.50 to SAE members, $3.00 to non-members.

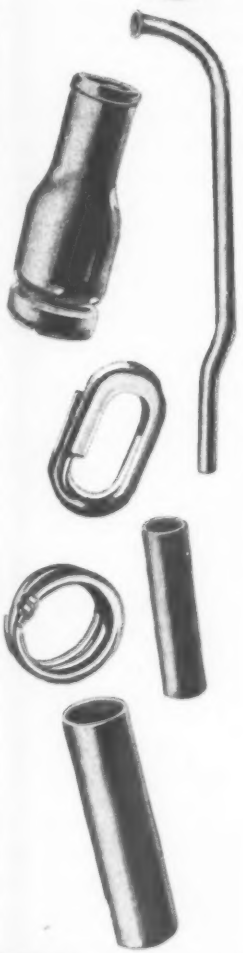
This book is a compilation of six reports requested of the Society of Automotive Engineers by the Army Ordnance Department on process control and repair of ferrous castings. It was developed by experts on steel, malleable iron and gray iron castings representing the largest commercial foundries, large motor vehicle manufacturers, consultants and Army and Navy personnel.

Subjects covered in recommended procedures for process control include a detailed discussion of melting processes, molding, cleaning, heat treating and material specifications as well as a general outline of the pitfalls confronting foundrymen. These procedures are intended to eliminate causes of scrap and defective material through careful policing of specified manufacturing methods which have been used with success in various plants. There is no intention to establish specifications.

A sincere attempt is made to bring the subject of repairs of defective castings into the open and under proper technical control utilizing the knowledge of proper repair methods and available materials. As a result, these procedures include a discussion of the important factors and limitations of repair methods such as oxyacetylene, metal arc, plugging, peening, use of sealers, brazing, soldering and rusting and their proper applications.

The book contains nearly 20 pages of tables, charts, photographs and drawings, plus an extensive bibliography of technical information on the subject.

SURPLUS unused *Tubing*



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157-7

Brass Foundry On Third Floor

(*Continued from page* 103)

to some extent on certain types of castings. As might be expected, the foundry is interested in producing castings with a surface as smooth as possible, and to obtain that result employs No. 1 Albany sand. The firm finds this sand possesses a grain fineness sufficient to produce the desired surface on the castings, and has a permeability which permits gases generated during pouring to escape freely through the sand.

As is customary in many brass foundries, the molder sets up a number of molds at which time a crucible of molten metal is available, and the molds are filled. After the metal has solidified the molds are shaken out, the sand tempered and placed back in the heap at the side of the molding machine. At the Atlantic foundry the molder makes the molds, sets the cores and closes the molds; the molds being set out on steel racks about 1 ft high with the rear about 2 in. lower. Weights are placed on the molds by a separate crew which also pours the metal, shakes out the molds and handles the sand.

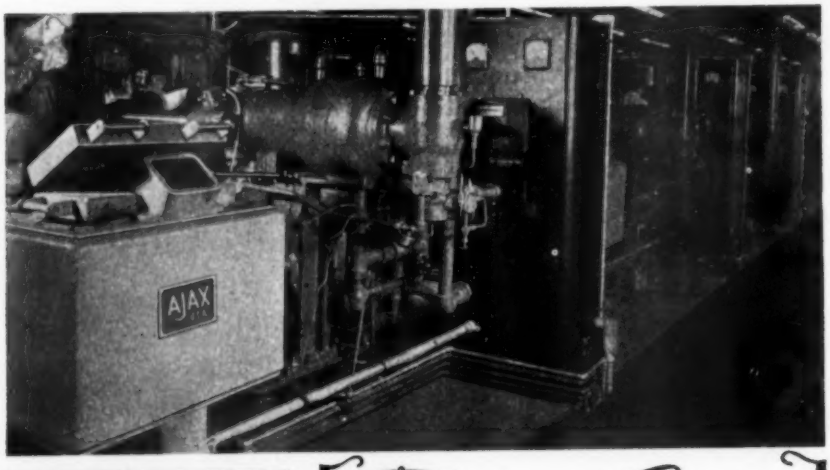
After the sand is tempered it is screened through a gyratory riddle suspended from an overhead monorail so that it can be moved from heap to heap. This operation removes any metal spills, etc., core butts, or other extraneous material and also aerates the sand as well as promoting uniformity. In addition to that routine operation the sand heaps from time to time are run through a mechanical screening device shown in Fig. 3 This equipment, mounted on wheels, is operated electrically. In addition to screening the sand, the machine ejects it in an open stream about 1 ft in diameter which promotes mixing and aeration.

Practically all the cores used in the foundry are small, hence no elaborate core department is required. Cores are made by hand, although a small core-blowing machine is available if production requirements warrant its use. Sand used for coremaking is a Berlin bank type. The sand is bonded additionally with core oil and some cereal binder to provide the desired physical properties in the core. Cores are baked in a small oven, placed on racks until they are used.

Employ Matchplates

Most of the castings are produced from matchplate patterns in snap flasks, and from 4000 to 5000 lb of metal is melted daily. Number of castings made in a mold depends of course on the size of the casting, and the flask used. Hence, the number may range from four or six in a mold to 30 or more. Some of the matchplates and castings are shown in Fig. 1, and it may be observed that in some cases the patterns are mounted perpendicular to the runner, and in others at an angle of about 65° with the runner. In all cases the main runner extends about an inch or so beyond the end of the last branch or branches forming a dead end pocket or collector for any loose sand or other dirt that might be carried along in the first rush of metal into the mold cavity.

As mentioned previously, the molds are set on steel racks with the back or end opposite the sprue about 2 in. lower. Hence, the force of gravity carries the molten stream to the end of the runner from whence it backs up gently without turbulence into the casting cavities. In the case of the patterns mounted at an angle to the runner, the back-filling is accentuated, since the gate is attached to the lowest point of the casting cavity.



JOHNSON SEAHORSE OUTBOARD MOTORS

OUTBOARD MOTORS contain a large number of aluminum die castings which provide uniformity in size, strength and quality, and avoid excess weight. High quality of castings is contributed by exclusive use of low frequency Ajax-Tama-Wyatt induction melting furnaces.

First . .

ALL ELECTRIC DIE CASTING PLANT

The photograph above shows a part of the Aluminum Alloy Die Casting Shop of the Johnson Motors Division of Outboard Marine & Manufacturing Company, located at Waukegan, Illinois, U. S. A. This is the first die casting plant in the world to use exclusively electric furnaces for melting and holding the metal to be processed in die casting machines.

A large number of Ajax-Tama-Wyatt low frequency induction melting furnaces have been installed at this plant. The small illustration gives a close-up view of the 20 kw. holding furnace. Automatic temperature control, gentle movement of the metal (which prevents segregation) and amazingly low maintenance cost are the principal features.

AJAX ENGINEERING CORPORATION
Trenton 7, New Jersey

AJAX TAMA-WYATT **INDUCTION MELTING FURNACE**

Associate Companies: **AJAX METAL COMPANY**, Non-Ferrous Ingot Metals and Alloys for Foundry Use
AJAX ELECTROTHERMIC CORP., Ajax-Northrup High Frequency Induction Furnaces
AJAX ELECTRIC CO., INC., The Ajax-Hultgren Electric Salt Bath Furnace
AJAX ELECTRIC FURNACE CORP., Ajax-Wyatt Induction Furnaces for Melting

With some matchplates the runner is located half in the drag and half in the cope with the branches or gates taken off at the centerline. In others the runner may be wholly in the drag or in the cope. Where the casting cavity is entirely in the drag, the preferred position of the runner is in the cope, although that rule is not adhered to rigidly.

After the castings are shaken out they are placed in wheelbarrows and transported to the end of the foundry and dumped in piles preparatory to the various finishing operations as shown in Fig. 4. First step in the procedure is the removal of gates and risers, this being accomplished by either of two methods. In the case of castings with light, narrow gates the operation is performed on a sprue-cutting machine of the shear type. Where heavier gates are used on castings the operation is conducted on a cut off type machine using a thin abrasive wheel operating at high speed. Table of the machine is adjustable so that it may be tilted at any desired angle to facilitate gate removal.

As the castings are severed from the gates, they are placed in steel tote boxes while the gates, runners, etc., are placed in steel barrels which when filled are moved across the room to the melting department. Steel tote boxes containing the castings are carried to a two-wheel, pedestal type grinding machine where the gate stubs are ground off smoothly. Between those various operations the castings are inspected to weed out any defective ones. Then they are placed in an abrasive blasting machine for cleaning. Following removal from the machine, they again are inspected, and then lowered to the floor below by a hoist for further operations such as machining, polishing and plating, etc. That applies only to castings for Atlantic Brass Works' own use, since the jobbing castings are shipped to the customers after cleaning and final inspection.

Gray Iron Division Names Committee

R. J. Allen, metallurgical engineer, Worthington Pump & Machinery Corp., Harrison, N. J., heads the 1946-47 program and papers committee of the Gray Iron Division of the American Foundrymen's Association, T. E. Eagan, Cooper-Bessemer Corp.,, Grove City, Pa., division chairman, has announced.

R. G. McElwee, manager, foundry alloy division, Vanadium Corp. of America, Detroit, is vice chairman and T. D. Parker, metallurgical engineer, Climax Molybdenum Co., New York, will serve as secretary.

Other members of the new committee are W. W. Levi, metallurgist, Lynchburg Foundry Co., Radford, Va.; K. H. Priestley, president, Vassar Electroloy Products Inc., Vassar, Mich.; A. E. Schuh, director of research, U. S. Pipe & Foundry Co., Burlington, N. J., and J. S. Vanick, metallurgist, International Nickel Co. Inc., New York.

The division's steering committee, at a recent meeting, tentatively decided to schedule four gray iron sessions of three papers each for the association's 1947 convention. One session would be a symposium on heat treatment, and another a welding practice symposium.

Book Review

Lessons in Arc Welding, cloth, 176 pages, 5½ x 8½ inches, published by Lincoln Electric Co., 12818 Coit Rd., Cleveland 1. Price 50 cents.

This new printing of the second edition, while not a complete revision, does contain some new material. It comprises 61 lessons in arc welding with numerous illustrations to supplement the text. Material in simple language sets forth practical instruction based on experiences of Arthur Madson, head instructor, Lincoln Arc Welding School.

Ajax ALUMINUM BRONZE ALLOYS

for WEAR-RESISTANCE

STABILITY AT HIGH TEMPERATURES

ABILITY TO WITHSTAND SUDDEN STRAINS

Investigation of Aluminum Bronze Alloys is warranted by foundrymen and designers where metal parts are subjected to either recurrent stresses or compressive forces and resistance to fatigue is sought; where the ability to withstand high temperatures or, where a high degree of corrosion resistance to many chemicals may be a significant factor in material selection. Supplied by Ajax in alloyed compositions of copper, aluminum and iron, as well as special alloys containing nickel and manganese, a complete selection of Aluminum Bronzes is available to meet all existing specifications as listed by Non-Ferrous Ingot Metals Institute, ASTM and the Federal Government.

Ajax, in adhering to its policy pioneered in the very infancy of the non-ferrous metal industry, exercises the closest scientific control over the production of these alloys. Metal men may look to Ajax with continued confidence not only for supply of highest quality Aluminum Alloy ingots, but also for practical technical know-how on correct foundry practice for producing better castings with fewer rejects. Request booklet "Ingot Metals of Today".

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Ajax Plastic Bronze
Ajax Anti-Acid Bronze
Ajax Phosphor Bronze
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Ajax Manganese Bronze
Ajax High-Tensile Manganese Bronze
Ajax Golden Glow Yellow Brass
Ajax Nickel-Copper 50-50%
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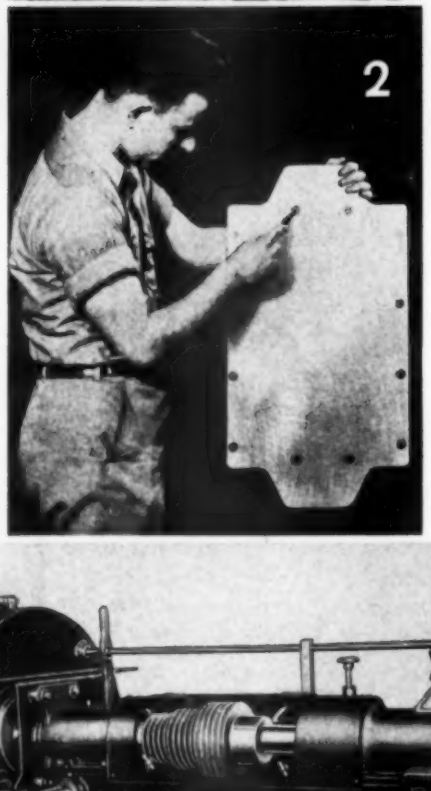
New EQUIPMENT and SUPPLIES



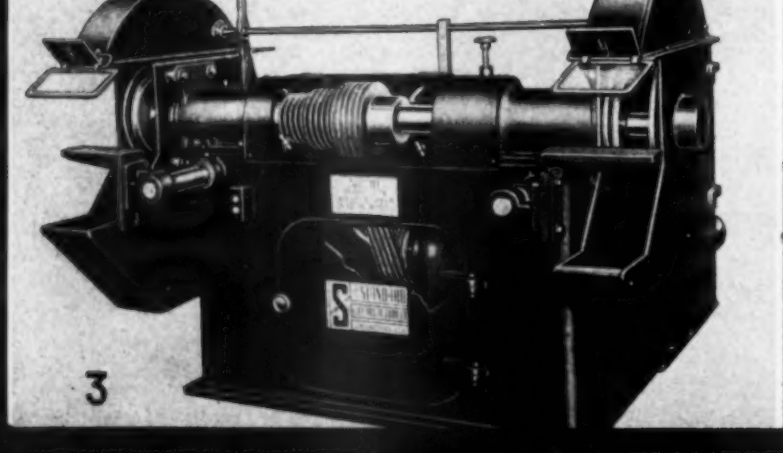
(1)—Goggle: American Optical Co., Southbridge, Mass., offers a new head-rest welding goggle which can be instantly thrown into "off-guard" position for rapid inspection of setups. Developed to eliminate waste motion and speed up welding operations, the goggle is attached by a friction joint to a comfortable head gear assembly. The welder with one hand can flip the goggle above his eyes, where it is held by the friction joint. Goggle is adjustable for individual features, equipped with opaque eyecups designed for wearing directly over eyes or over personal prescription glasses, and has ventilated side shields which keep out light, sparks and metal splashes, yet provide ventilation to reduce fogging. They are available with Noviweld or Noviweld-Didymium lenses in certain shades.

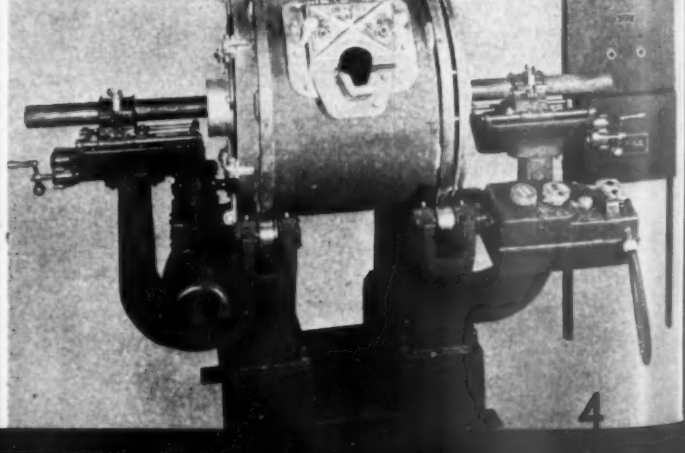
(2)—Pattern Plate: Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, announces a new flat aluminum pattern plate which has tough knurled steel inserts cast integrally around the perimeter to distribute and equalize wear at flask contact points. This is said to result in greatly increased plate life. Surface of the plate is specially machined to prevent sand slippage, and a 1-in. allowance all around is made for flask strip. Three-in. standard ears at each end will accommodate all types of flask-pin guides. Edges are rounded for easy handling.

(3)—Grinder: Standard Electrical Tool Co., 2507 River Rd., Cincinnati 4, has redesigned its multiple speed snagging grinder, which is now available in sizes for 18 to 30 in. wheels. There are three spindle speeds so that grinding efficiency may be maintained throughout wheel life by changing speed as the wheels reduce in diameter. An interlocking arrangement prevents overspeeding of the wheels. Powered through multiple V-belt drive, the grinder is equipped with protected ball bearings, oil reservoirs fitted with sight feed gages, shaft lock for use in changing wheels, adjustable and removable work rest at each wheel and steel guards with adjustment to compensate for wheel wear and fitted with adjustable spark breaker and shatter-proof glass eye shield. Grinder is furnished to specifications for vitrified bond or resinoid bond grinding wheels.

(4)—Furnace: Detroit Electric Furnace Division, Kuhlman Electric Co., Bay City, Mich., has developed a new type indirect arc rocking electric furnace which is designed for easy change of shells to permit melting of a wide variety of ferrous and nonferrous alloys. The new furnace is rated at 100 kw with 200 lb nominal cold charge capacity and features nonrotating graphite electrodes supported by stationary brackets. Flexible copper conductors allow power to be brought to the water-cooled electrode clamps from bus bar above or below the furnace. Withdrawal of electrodes permits the melting chamber to be removed without detaching electrode brackets. All controls over melting time, and other melting factors are at the operator's finger tips. The furnace has melted seventeen 225-lb heats of red brass per nine-hour day with total energy consumption of 318 kwhr per ton.

Feed Valve: Oil-Rite Corp., South 13th St., Milwaukee 7, offers a new sight feed valve with unbreakable plastic sight for oil circulating systems. These valves are used wherever the rate





of oil flow must be visually checked and regulated permitting occasional adjustment or fixed settings. Construction is of brass with two main parts—sight feed housing with unbreakable plastic sight or glass sight for temperatures above 150 F, and regulating unit. Sight feed valves are available with hexagon bodies of ¾, 15/16, 1⅛, and 1 5/16 in. and male and female pipe threads of ⅛, ¼, ⅜ and ½ in.

Material Handling: Monroe Auto Equipment Co., Monroe, Mich., has developed a new line of light-weight material handling equipment made of high tensile steel. Included in the new line of equipment are basic platform skids, available with or without runners

and offered in two sizes: 33 x 54 x 12 in. and 42 x 60 x 12 in.; nestling rings, 33 x 54 x 18 in. and 42 x 60 x 18 in.; platform boxes, 33 x 54 x 12 x 24 in., 42 x 60 x 12 x 24 in. and 42 x 60 x 30 in.; wood and steel platform skids, 33 x 54 x 12 in. and 42 x 60 x 12 in.; wood and steel pallets, 48 x 60 in. and 48 x 48 in.; all steel pallets, 48 x 48 in., 48 x 60 in. and 36 x 48 in.

Electrode: Air Reduction Sales Co., 60 East 42nd St., New York 17, offers a new extrusion coated self-hardening electrode for use with either an ac or dc machine. The new extruded coating is strong, has little tendency to pick up moisture and is uniform. Typical uses of the new electrode include hard facing in building up worn areas of tractor lugs, shovel teeth, manganese steel crushing equipment, etc.

Oil Seal: Johns - Manville Corp., 22 East 40th St., New York 16, has developed a new type oil seal packing for the protection of bearings. The new product, known as Clipper Seal, is made with a heel of resin-bonded fabric, giving it the rigidity essential for a press fit in the cavity and with a lip of tough but soft flexible compound. Lip design makes it possible to vary the

☆ little but— Oh My!

Carries its weight

in your Foundry where there's work to do. Save those castings with Shelton surface patching cement—sets like the Rock of Gibraltar.

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AMERICAN CRUCIBLE COMPANY
SHELTON, CONN.

Alnor **PYRO LANCE**
built for foundry service

The rugged, shock resisting pyrometer movement and the enclosed extension thermocouple make a unit especially designed for foundry service. It is easy to secure the quick, accurate temperature readings which are so important in the efficient production of sound castings.

The Alnor Pyro Lance is especially designed for use with molten brass, bronze, copper, aluminum and magnesium alloys and similar metals where temperatures are not over 2300° F. With its enclosed thermocouple the Pyro Lance takes true temperatures below the surface, unaffected by dross or surface conditions. Write for descriptive bulletin.

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The Smith Facing & Supply Co.
1857 Carter Rd., Cleveland, Ohio

bearing area and control pressure of the lip against the shaft by means of a garter spring, thereby reducing shaft wear to a minimum. The seal is said to provide a positive lubricant-retaining, dirt-excluding seal, automatic in operation, adaptable to a wide range of conditions and resistant to most forms of corrosion. They are made in sizes for shafts 1 5/16 to 37 in. diam. in both endless and split types.

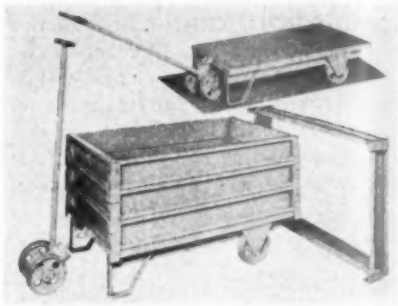
Power Package: Salisbury Motors Inc., Pomona, Calif., is producing a new product consisting of a 6-hp gasoline engine with automatic clutch and transmission, designed to transmit the engine's power smoothly and at the most advantageous speed, depending on load. The power package will power light vehicles or fit almost any station-

ary use in which a small engine is required to transmit power gradually and at varying speeds to a driven machine. Engines, clutches and transmissions are available separately or complete in the unit.

Welding Kit: Moorewood Electric & Mfg. Co., 1718 East Florence Ave., Los Angeles 1, is offering a welding service kit consisting of four welding units and replacement parts to keep them in continuous operation. It contains four electrode holders, two grip handles, four upper jaw insulations, four lower jaw insulations, two lever handles, two springs, one upper jaw, one lower jaw, one connector core, one set screws and one wrench.

Temperature Control: Claud S. Gordon Co., 3000 South Wallace St., Chicago 16, offers a temperature-variation control capable of maintaining variation within 1/5-F and power "on-off" cycles as short as 3 sec. The new control may be used on all types of electric furnaces, ovens, injection molding machines, etc., employing conventional millivoltmeter and potentiometer type controlling pyrometers or gas-fired equipment employing solenoid-controlled or motor operated valves. It is housed in a cast aluminum case 6¼ x 8¼ x 3 in.

Semi-Skid: Market Forge Co., Everett, Mass., has developed a new line of all-welded steel semi-skids and jacks. The semi-skid is designed so that it may



be used with hand or power lift truck. The skid jack unit is equipped with two 8-in. diameter wheels mounted on roller bearings with a hardened axle. More than 1 in. of lift is provided for the front legs, allowing it to travel over ordinary obstructions. All-steel nesting type box sections can be furnished to retain loads. The semi-skids and skid jacks are available with wheels of semi-steel, plastic, cushion rubber and aluminum.

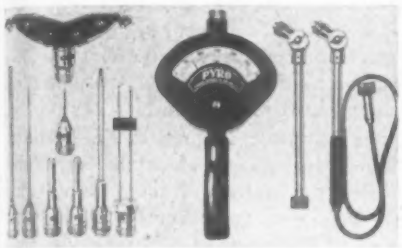
Unloader: Towmotor Corp. 1226 East 152nd St., Cleveland 10, has developed a new unloader for use with all sizes of Towmotor lift trucks. It is particularly adapted to loading box cars. The unloader is operated by the driver from his regular position. Two double acting hydraulic cylinders move the ver-

tical rack forward, pushing the load off the forks. Other applications of the unloader are also possible because its pulling power is equal to pushing power.

Contour Sander: Sand-O-Flex Corp., Dept. 423, 4373 Melrose Ave., Los Angeles 27, has added a new brush-backed contour sander to its line of abrasive tools. The new grinder is a duplicate of a predecessor model introduced

recently but is smaller in diameter—3⅝ in. Overall diameter is 5½ in., weight 1⅞ lb. It is available for ½ and ⅝ in. shafts and requires either a 1/6-hp motor or ¼ capacity electric hand drill.

Pyrometer: The Pyrometer Instrument Co., 103 Lafayette St., New York 13, offers a new surface pyrometer. Constructed in a shock, moisture and dust-proof shielded steel housing it is not affected by external magnetic influences. It has a 4-in. diameter direct reading scale covering temperatures from



0-1200 F and a choice of eight thermocouples and two types of extension arms, all interchangeable without adjustment or recalibration.

Micrometer: Tubular Micrometer Co., St. James, Minn., has developed a new precision measuring device for measuring bores without removing the boring bars. These inside micrometers are made with hollow box-type steel frames, making them light in weight but rigid. All frames have a vacuum in the center to insure minimum expansion and contraction due to temperature variations. The new micrometer is available in sizes 8-28 in., and will cover bar diameters 4-8 in. All sets are furnished complete with necessary mandrels adjusting wrenches and are packed in protective hard wood cases.

Oxygen Analysis: Central Scientific Co., 1700 Irving Park Rd., Chicago 13, is making an oxygen determination machine which requires only 10 minutes for analyzing the oxygen content of open-hearth melts. In the procedure, a sample is poured into a specially designed mold. A piece of this sample is weighed and introduced through a mercury vacuum lock into an induction furnace operating under vacuum. At a temperature of 2800-3000 F, the sample melts in 20 seconds, and all oxides are reduced by the carbon present in the graphite furnace crucible. Resulting carbon monoxide is then accurately measured, and the per cent of oxygen is computed from a simple equation. The apparatus is completely inclosed in a steel frame, protected both electrically and mechanically.

FOUNDRY FACINGS

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GRAPHITE

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AN OUTSTANDING SHAKE-ON FACING

CARBON RAISING

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TAMASTONE
SAVES THE DAY!

Production Increased 600%

★ *Amazing yet true!* . . . because with original loose pattern equipment, the foundry was only able to produce 35 molds—castings per day . . . but, with TAMASTONE, production jumped to 110 molds—220 castings. OVER 600% INCREASE!

Cope Side shows 3" high white metal section set in TAMASTONE due to thin projections plus fact 2 ram-up cores must be used.

Here's how TAMASTONE did the trick . . . a duplicate TAMASTONE pattern was made. These were then used in a 14 x 16 flask. Check photos—see how simple it was to step up production. Write for literature on Foundry Specialties.

Drag Side entirely of TAMASTONE—3½" draw cup pattern.

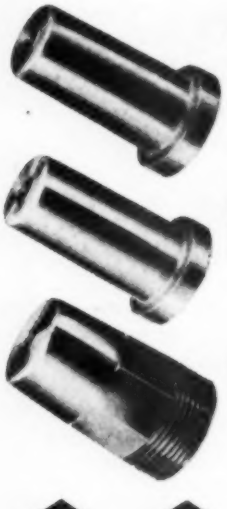
TAMMS SILICA CO.
228 N. La Salle St., Chicago 1, Ill.

★ Photos courtesy of Efficiency Match Plate Co., Chicago.

Hard Hearted

American Long-Lyfe Nozzles are hard-hearted because they have to be! For years leading industries have been choosing them to do the "tough" airblasting jobs. Foundrymen know through actual experience that American Nozzles are tops for low hourly cost and long-life efficiency.

The American-Norbide **nozzle has an insert of boron-carbide, the hardest material ever made for commercial use; the *American-Heanium* nozzle has a ceramic insert of near-diamond hardness; and the *V-Metal* nozzle is made entirely of abrasion-resisting alloy steel . . . the same material being used for the protecting jackets on the two nozzles first named.**



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A compact high-frequency converter, operating on 220 v, 60 cycles, supplies the power for the induction furnace.

Wash Fountain: Bradley Washfountain Co., 2217 West Michigan St., Milwaukee 1, has added a new model to its line of washfountains for use in washrooms of plants, offices, engineering and drafting departments. A duo model, equipped with sprayhead instead of faucets, it enables two persons to be served at the same time, the one spray-

head replacing the usual four faucets. Besides reducing piping conections, saving space and simplifying maintenance, the fixture has a foot treadle which controls spray, and a self-flushing deep bowl which prevents collections of dirty contaminated water. Furnished either in stainless steel or white enamel iron, a pedestal panel encloses connections and mixer, saving space and simplifying maintenance.

Coolant Pump: Delta Mfg. Division, Rockwell Mfg. Co., 623H East Vienna Ave., Milwaukee 1, offers a new coolant pump as an accessory to machines where free flow of coolant is required. The centrifugal type pump will deliver 30 gpm at low heads and up to 2 gpm of water to a 14 ft head. Flow may be adjusted from wide open to a mere trickle. Pump outlets are drilled and tapped for standard pipe fittings, and the flat machined flange permits use on most wet machine tools. Pump is operated by a ¼-hp fully enclosed and double-sealed motor and comes complete with 16-gal tank.

Analyzer: Davis Emergency Equipment Co. Inc., 114 Halleck St., Newark 4, N. J., has developed an instrument which will record CO_2 percentage variations in content of flue gas within 3 sec. after gas reaches analyzing cell. Continuously operating suction pumps are elminated. Flow rate through gas sampling line does not exceed 250 cu. cm per min.; minimum flow required is 20 cu. cm per min. This low flow rate eliminates the need for filtering trains and driers. A sampling line arrangement expels condensate and harmful acids automatically. Continuous recording of CO_2 changes is accomplished with a Recorder furnished with 24-hour circular charts having a range of 0-20 per cent CO_2. Control cabinet and recorder are panel mounted at any location convenient for observation.

Induction Heater: Induction Heating Corp., 389 Lafayette St., New York 3, has developed a new high-frequency induction heating generator which can be used for brazing, soft soldering, fusing, hardening, annealing, tempering, stress relieving, forging, melting, shrink fitting, debonding and expanding. Fully loaded, the heater will develop 1400 Btu per minute or approximately 25 kw at a nominal frequency of 375 kilocycles into a piece of work. It has a full-load input of 50 kva at 90 per cent power and operates on a 205-245 v, 60-cycle, three-phase power supply. Power output may be adjusted from 10 per cent to full load by means of a single dial. The heater is equipped with a number of automatic safety features to protect both operating personnel and equipment. It weighs 3700 lb and is 42¾ in. wide, 39¼ in. deep and 73¾ in. high.

Rectifier: Electro-Tech Equipment Co., 119 Lafayette St., New York 13, offers a new line of rectifiers. Variable dc voltage is obtained by rotating a knob on the front panel. Selected voltage and amperage is indicated on the voltmeter and ammeter on the front

panel. The three leading models have an input of 115 v, 60 cycles and output of 12 v dc, capacity 25 amps; 12 v dc, capacity 50 amps; and 8 v dc, capacity 150 amps. All models are continuously variable.

Fire Hose: American-LaFrance-Foamite Corp., Elmira, N. Y., offers a new line of double-jacket tailored, water-repellent, mildew resistant fire hose. It will withstand temperature extremes and is flexible for easy handling at time of fire, and for racking snugly before and after service.

WHERE ARE DOGS OF YESTERYEAR?

(*Continued from page* 110)

prime favorite. The earliest one I know of was designed by Giovinni di Bologna and stood on one of the magnificiently landscaped estates of his Italian town. This design was copied by our American foundrymen and with very good success, (Any similarity of the name of this distinguished sculptor, Bologna, with a popular form of meat product is purely coincidental).

While the metal dog and his kind and the zinc man and his kind were not conceived in America, it was in America that this type of lawn ornamenture or iron wild life, reached its climax in the profession. The greatest output was in the period beginning in the fifties, going strong in the sixties and seventies, a fair trade in the eighties and not so bad in the nineties. It was no small industry, this designing, casting and selling of lawn animals and statues.

Conducted Big Business

We have written at considerable length about the foundry of M. J. Seelig & Co., in Williamsburg, Brooklyn, which I believe turned out more of this product than any other foundry in this country, unless it were the Philadelphia Ornamental Iron Works, founded and conducted for many years by Robert Wood. With a single helper, Mr. Wood started a two-man smithery and 20 years later it occupied an entire square. As early as 1854 it was issuing handsome folios containing lithographs of designs to be executed in cast iron. Three hundred men were employed by Wood in 1874, and there was a branch at New Orleans. In size it surely eclipsed the Seelig establishment and if it did not turn out more lawn animals and statues than Seeligs, it was because Wood made ornamental fences, balcony railings, roof ornaments and other products as well.

Robert Wood was the first to cast large bronze statues in this country. Before he undertook this ambitious work most of the statues in bronze were made at the famous royal foundry, Munich, Germany. Mr. Wood cast large bronzes for all the prominent sculptors of the day, J. Q. A. Ward, Launt Thompson, Brown, J. A. Bailey, Calverly, John Rogers and others. Brown's Abraham Lincoln in Union Square, New York, the equestrian statue of General Scott at Washington, Abraham Lincoln at Prospect Park, Brooklyn, and the statue of Governor Clinton, Washington, were cast by Wood & Co.

Then there was *Taking the Oath* modeled by John Rogers with other subjects

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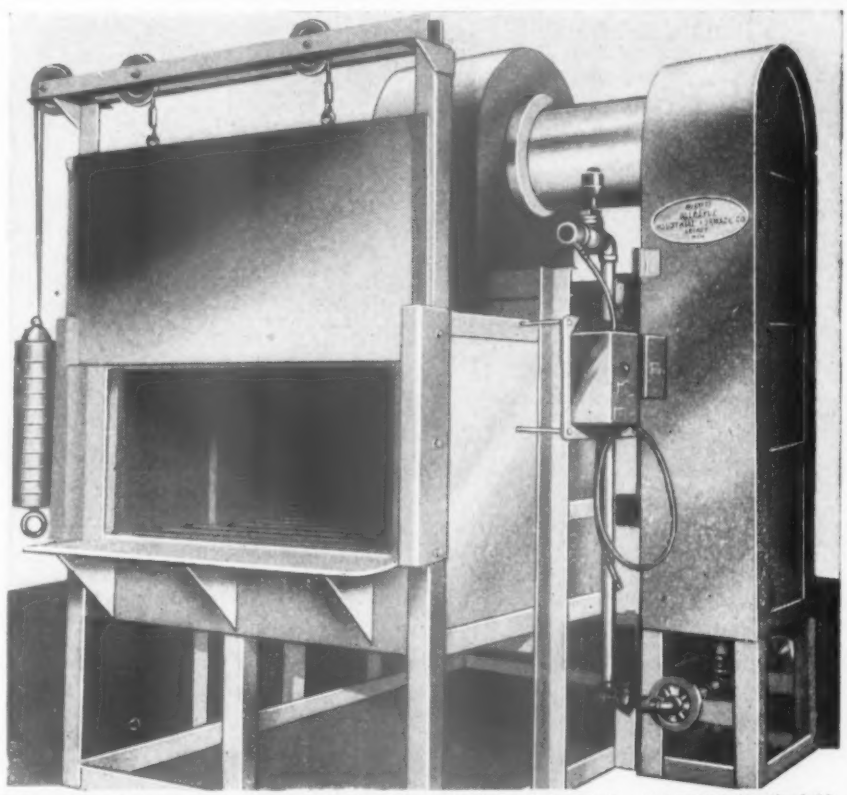

Bellevue batch type furnace for the heat treating of aluminum alloys, consists of atmospheric type burner mounted on the lower end of the duct which is used for recirculating the air back into the furnace. Garden City high temperature fan is standard equipment for recirculating the heated air. This method of heating holds temperature with little or no variation. Mounting the burner in the duct eliminates the necessity of an extra heating unit. . .send us your heat treating problems. . . our engineers will make a proposal without obligation.

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by him (the Rogers Groups), the figure of *Hope* for Cincinnati, O. From Ward's modeling came *Shakespeare, Citizen and Soldier* and *Indian Hunter and Dog* in Central Park, New York, as well as the statue of General Reynolds in the battlefield at Gettysburg. The bust of John Brown, modeled by Calverly, for the Union League, New York, and Launt Thompson's General Sedgwick, West Point, N. Y., are some of Wood's ambitious and creditable bronze-casting achievements.

The report of an English commission which visited America on an industrial tour in 1859, commended Mr. Woods' various products most highly and added the interesting information that Mr. Wood was then engaged in the production of a cast iron statue of Henry Clay, 45 ft high, to be placed on a Doric column of the same metal about to be erected by the citizens of Pottsville, Pa. Their tall memorial, purchased by popular subscription, still stands at the terminus of Schuylkill valley.

Many Firms Engaged

The Wood and the Seelig foundries, so far as I can learn, did most of the actual casting and probably designing of this class of work, but there were other dealers and prominent, too, who were known internationally in the trade. The imprint of Henry Dibblee, Chicago, appeared on many garden ornaments of this type. He was an extensive dealer but never designed or cast any of this product. At the time this information was collected, the Dibblee concern was still going strong but specializing in mantel pieces and appurtenances. The Mullens Mfg. Corp., Salem, O., also devoted some attention to this type of commercial art during the period.

Another western concern was the E. T. Barnum Iron & Wire Works, Detroit, now a great industrial establishment. It never manufactured metal animals, but purchased these from the J. L. Mott Iron Works and the J. W. Fiske Iron Works, New York.

Both Fiske and Mott were extensive dealers but they, too, generally purchased the castings from other foundries. Never an important part of its business, the Mott company long since has quit the zinc and iron products fashioned after living things and destined for the garden and lawn. About the time the iron lion and zinc lamb began to lie down together less frequently, the Mott people seized upon a novelty called the stationary bath tub, first viewed with some suspicion by our people but now grown to a deserved popularity. The latest figures show one bath tub for every 20 people which, considering there is only one automobile to every seven people, is evidence of something or other.

The Fiske concern also grew extensively in other lines under the comprehensive term of ornamental iron work and later expressed willingness to take an order for a lion, stag, dog, lamb or what have you. It even has some catalogs left but carefully warns that, "the prices are out of date." No wonder!

Lions? Certainly, big or little, one more than 7 ft overall; a sitting Leo, more than 4 ft high; these for the show places. A prime lion cost $460 but there were cheaper breeds. Tigers were about the same price but never popular. The tame lion, with mortar and pestle, combination of the sculptor's and the apothecary's art, was a popular side line.

Gambrinus was not often seen on lawns but was highly popular for palatial breweries. Gambrinus, I hear, is a name corrupted from Jan Primas, said to have been an Egyptian and associated with the ancient beer business—probably Old Pharaoh dark beer which had a collar only exceeded in size by that worn on the necks of the Israelites. Gambrinus was had in natural colors or bronze at $250. Shop early for Christmas.

There was a scattering of "ram, lamb, sheep, or mutton," rabbits and such statuary but these never amounted to much.

Take Your Choice

Hebe, goddess of pubescence, must have been a popular subject, for she was sold in two designs, one after Canova, who preferred the pitcher at the forehead, and another after Thorwaldsen, pitcher dangling in right hand.

When it comes to this water-pouring business let us present one of the Danaidae. Probably there were purchasers of Prof. Rank's 5 ft, 3 in. lady in zinc, who, when asked the significance of the water pitcher, could give out neither sight, sound nor time of day. Being in that class, I have looked into the history of old Mr. Danaus's family. He was a king, which didn't mean much, and the father of 50 daughters, which meant a great deal in general and a greater deal in particular. Danaus had a brother, Aegyptus, who was also extensively engaged in the fathering business and had 50 sons. Danaus offended Aegyptus and fled with his 50 daughters. Aegyptus overtook Danaus, of course; think of the handicap of fleeing with 50 women!

Danaus squared himself by marrying his 50 daughters to their cousins, the 50 Aegyptus boys. There was a stipulation between father and daughters which might have vitiated the contract, if made public, to-wit, the the 50 brides should murder their husbands at their earliest convenience. All carried out their father's

instructions except Hypermnestra; her alibi I know not. For this scurvy trick all Danaus girls were sent to hell to pour water forever into a broken cistern, or to draw water to the cistern in a sieve by way of diversion. Just where the water was obtained in that locality and why it was not sold to the other inmates at fabulous prices per drop was not considered in those days when applied science and chairs of salesmanship were unknown.

Times do change but mostly in cycles. Every dog has his day but he is still a dog, no matter what variety in color or shape or size or how much he cost or is worth, whether he chases deer, wolves, men, rabbits, or his own tail, loving a sphacelated bone (pardon us, that means decayed), hating fleas and cats. So with the so-called iron dog. He is not seen anchored in lawns, now. He was common in the gay nineties and eager eighties; therefore, the popular superstition that he orginated then and, consequently, is to be laughed at as emblematic of that crude, unsophisticated period. The iron dog has been on duty many, many years longer than that dating from the elaborate Italian, French and British gardens and show places of decades and decades ago.

What About Iron Pigs?

By "iron dog" we group all the ferrous fauna and ferruginous flora with which lawns and estates once were liberally bestrewn. There was the stag who rivaled if not excelled, old iron dog Tray in numbers and popularity. And ferric felis Leo! The metal lion was, as in the animal kingdom, the king, seen about the most pretentious houses, on the most spacious grounds and guarding the most eminent eminences. Few cottagers or tired small-business men sported lions in their door yards. Even the stag had to have some ground and he naturally gravitated from the spelter sudios to the large lawns. Real deer being so cheap in this country for so many years, metal deer domestication was conscribed and colonization retarded. One could always tell a live deer from a metal because the latter eternally was looking up as they do in typical stock certificate ornamentation.

No, the zinc or iron lawn animal is not a novelty originated in the what-not and roaring-sea-shell era. I would not pretend to state, and I doubt that the most prodigious research would develop, when the first stationary stag, immovable lion and anchored dog first graced the grounds of a home on this planet. Yet, it must have been some time subsequent to the palmy days of the Garden of Eden when all the animals roamed about the garden at will so there would be not the slightest occasion for imitations. Further than that, we scientists do not

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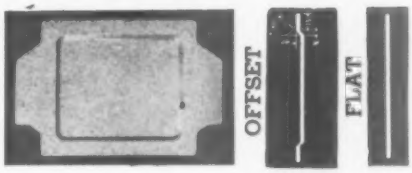

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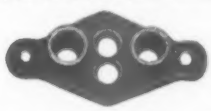

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There was a large variety of dogs in metal. You could have the French game dog with thoughtful and solemn expression or, if you preferred, a French game dog with a more optimistic expression looking for game just around the corner. He could be had with or without bird. No lawn animal line was complete without the Molossus or antique dog. He had the upward and forward and possibly the flexible outlook, if a metal dog, in any sense, can have the attribute of flexibility. He occupied considerable space, 49 in. long, 26¼ in. wide, 3 ft, 6 in. high. But why denominated "Molossus"? A distinguished name at least, for was not Molossus the son of Pyrrhus and Andromache? Having consulted the encyclopedia, I shall answer, yes. Andromache, although drawn by Pyrrhus in a raffle, was a lady of prominence, the wife of Hector who was killed by Achilles, as were her father and seven brothers, in the battling in and about Troy. Pyrrhus was the son of Achilles, and that northwestern part of Greece settled by Pyrrhus was named Molossia in honor of his son. A niece of one of his descendants was the mother of Alexander the Great—nice people, you know.

There was the mastiff, the prairie dog, Scotch terrier, reclining or sitting up taking notice, bright-eyed Spitz, to mention a few canines that foundrymen cast in those days.

Liquid Shrinkage of Castings

Metals and alloys decrease in volume when changing from the liquid to the solid state. Nothing can be done to prevent liquid or solidification shrinkage from taking place. The higher the temperature is raised above the melting point the greater is the liquid shrinkage which takes place before the casting sets. Melts for thin castings need more superheat than do those for thick or heavy ones. Also, metals which lose heat quickly require a higher casting tetmperature.

Thin sectional castings do not show evidence of shrinkage defects when poured with hotter metal as do those of thicker section. This is because they set much more quickly. When a casting takes an appreciable time to become solid it is much more likely to contain shrinkage cavities. The cavities when present are found in those places which set last. Alloys which freeze over a range of temperature give more trouble from shrinkage defects than does pure metal which freezes at a definite temperature.

From *Fluxuations*, No. 14, published by Foundry Services Inc., New York.

These statements hold for castings made in all type of molds and cores, whether formed from sand, semi-permanent or metallic construction or for permanent molds or die castings. In practice, the problem is greatest in sand castings because they are usually much larger, and cooling in sand molds is much slower. The foundryman has various methods he can apply to help overcome the problem of liquid shrinkage.

Casting design is of prime importance. Generally, the modifications needed are simple, such as an evening out of sections, removal of ribs and bosses or placing them in alternative positions; altering the shape of cores, making extra use of cores or leaving them out entirely. Each type of casting forms an individual problem.

After design, progressive or directional solidification must be studied. In many cases, sectional differences cannot be eliminated, and here it remains for the foundryman to exercise his skill and knowledge. Since instantaneous soldification of all parts of a casting is an unobtainable ideal, the next best thing to strive for is progressive freezing from the part of the mold where the metal first enters to final setting at the place it reaches last, which is the riser—when one is used. The placing and arrangement of the gating system can do much to aid or retard progressive solidification.

Risers Feed The Castings

Risers are used as a reservoir of molten metal for feeding the casting as it solidifies. For maximum results the surface of the liquid metal supplying the feed should be kept under the action of atmospheric pressure as long as possible. When a riser becomes solid on the surface its effectiveness is greatly reduced, and may be removed entirely, even though liquid metal still remains underneath.

Feeding or anti-piping compounds are now available for use with all types of casting metals and alloys, both ferrous and nonferrous. They contain heat generating substances and are adjusted so as to give rapid or delayed action according to the requirements of the casting and the alloy from which it is poured.

With nonferrous castings it is important that no deleterious impurities are introduced into the alloy which might contaminate subsequent melts in which the risers are used for remelting. Steel casters specify that, for special steels, no carbon pick-up should take place.

Not only do these compounds do away with the necessity of rod feeding, but in many cases they allow a substantial

reduction in the volume of the riser, thereby allowing a greater percentage of castings to metal melted.

Progressive freezing is induced by maintaining the risers hot and fluid. Heat generation and insulation both help in this direction. Keeping the surface of the riser molten insures that full benefit is obtained from the pressure of the atmosphere in forcing liquid metal into cavities formed by the contracting liquid in the casting.

Feeding compounds should cover the riser immediately metal appears in them so that as little heat as possible is lost by radiation and convection. A method of insuring this and making the operation automatic is to place the required amount in a container. This container may be cone shaped (such as some paper drinking cups) and is placed in the riser before casting starts. The rising metal burns away the container and the feeding compound covers its surface with a minimum loss of time.

Dimensioning, Shop Processes Described

"Dimensioning and Shop Processes," a bulletin of the Agricultural and Mechanical College of Texas, describes some of the shop practices which furnish a background for rules and procedures of dimensioning. Its purpose is to present a philosophy of dimensioning for beginners in the field of engineering drafting. The use of the drawing in the foundry, pattern, forge and machine shop is described.

Book Review

The Aluminum Industry, by Stanley V. Malcuit, 36 pages, 6 x 9 in., paper published by Bellman Publishing Co. Inc., 6 Park St., Boston 8. Price $1.

This is one of a series of 75 occupational booklets used in connection with guidance activities wherever general counseling work is conducted and for individual reference purposes in the choice of a career. It outlines the production of aluminum products from mining the ore, through reduction processes, semi-fabrication including castings and wrought products, making the finished product, including heat treating, machining and finishing, to the uses and marketing of aluminum.

The booklet describes organizational functions in the industry, typical jobs obtainable, personal qualifications needed, education and training required, analysis of opportunities for employment and advancement, remuneration and advantages and disadvantages of the industry.

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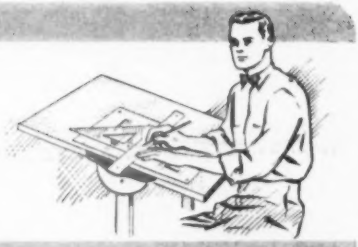

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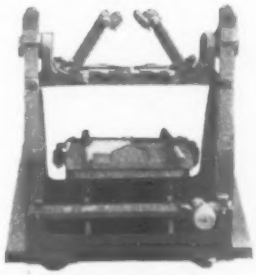

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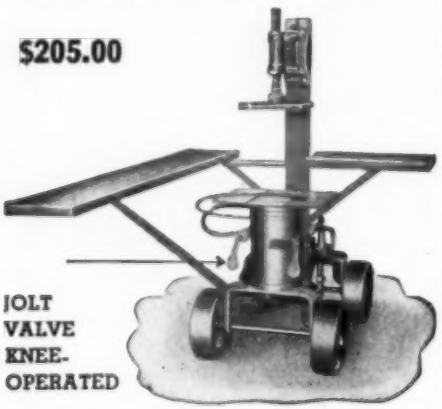

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ALUMINUM CASTING

Shipments for 1945 Summarized

SHIPMENTS of aluminum castings increased steadily in 1942 and 1943, leveled off in 1944 and remained at a high level during the first quarter of 1945, according to a review of the aluminum castings industry for 1945 published by the Bureau of Census, Industry Division.

Starting with April, 1945, a general decline set in which continued through VJ-Day, reaching a monthly low for the year in September when 15,805,000 lb were shipped. This was less than one-third of the March volume of 50,275,000 lb which was the peak for the year. The year ended with monthly shipments only slightly above the September level.

1945 Aluminum Casting Shipments

Type	Pounds	Per Cent	Foundries Active Dec. 31
Total	395,007,150	100	1528
Sand	213,891,880	54	1371
Perm. mold	108,259,213	27	113
Die	70,667,419	18	107
All others	2,188,638	1	44

Largest decline in aluminum casting shipments occurred in sand castings. From January to May, 1945, monthly sand casting shipments averaged 27,000,000 lb then dropped to 7,313,000 lb in September. In January, 1945, sand castings shipments—27,168,000 lb—were more than twice as great as those of any other type of aluminum castings, but by December the number of sand castings shipped—7,222,000 lb—was equaled by shipments of permanent mold castings—7,248,000 lb.

Permanent mold castings rose from 23 per cent of total shipments in January to 41 per cent in December. Throughout the year, month-to-month changes shown for permanent mold shipments were smaller than for any other type of aluminum casting.

There were 1528 aluminum foundries in operation on Dec. 31, 1945. Of these, 1371, or more than 90 per cent, made sand castings during the year. Permanent mold castings were produced in 113 foundries, many of which also made sand castings. Die casting establishments numbered 107.

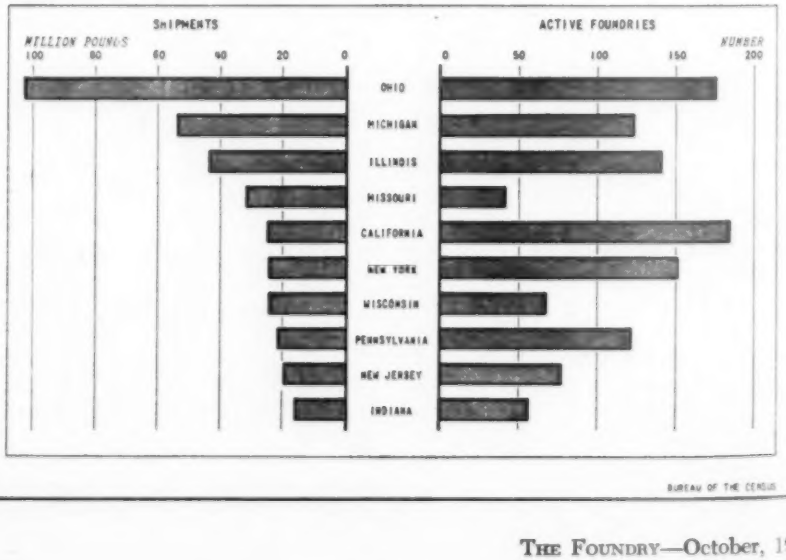
Annual shipments from foundries producing sand castings ranged from less than 100 lb to over 12,000,000 lb and averaged 151,000 lb per foundry. For permanent mold castings, annual shipments averaged 895,000 lb per foundry, and for die castings, 630,000 lb.

Of the 1574 aluminum foundries operating at the beginning of 1945, only 46 discontinued production of castings by the end of December. In general, these were large foundries and their annual shipments averaged over one million pounds, almost five times as high as the average annual shipments for foundries which operated throughout the entire year. These inoperative foundries for the most part were reconverted to some other type of operation or, in the case of government-owned plants, were maintained in a stand-by condition.

Seven states accounted for over three-fourths of total aluminum castings shipments. Ohio led with 26 per cent, followed by Michigan, 14 per cent; Illinois, 11 per cent; Missouri, 8 per cent; California, New York and Wisconsin, 6 per cent each. Although ranking fifth in size of total shipments, California ranked first in number of foundries, having 185.

Data covered by the Bureau of

TOTAL SHIPMENTS AND NUMBER OF ACTIVE FOUNDRIES, TEN LEADING STATES, 1945



Census' report include both commercial shipments and shipments for the producing companies' own use. The quantities represent the weight of castings before machining but after removal of gates, risers, etc.

CENTRIFUGALLY CAST STEEL IN WARTIME GERMANY

(*Continued from page* 97)

use of chamotte liner inserts, but the results obtained were but little different from those resulting from the use of the rammed chamotte. Dry silica sand was used as a liner in the next series of development tests. This manipulation proved successful and led to the practice used during the war years. The successful method was perfected in 1938.

Recent Practice—A sketch of the centrifugal casting machine developed is shown in Fig. 2. The mold is supported by rollers, run in water and packed by rubber sleeves on both ends. Machines are equipped in such a manner that, by insertion of an intermediate section, a lengthening of the machine results without difficulty, which permits insertion of molds of varying length. The operation practice of producing a tube or a gun is described in the following paragraphs.

Washed and dried quartz sand of 0.2 to 0.6 mm in diameter is placed in a pipe, the size of which depends on the inside diameter of the tube. The pipe has a slot along its length, the slot width being about one-fourth the circumference of the pipe. The dry sand is uniformly distributed along the pipe and leveled off with a strickle run along the slot. The mold, a chromium molybdenum steel tube, (approximately 0.35 per cent C, 1.50 per cent Cr and 0.25 per cent Mo), is rotated at a high speed (1400 rpm for 9 in. OD tube), and the pipe containing the sand is run into the mold. The pipe is tipped in the direction of mold rotation and the sand spilled into the mold uniformly along the mold length to a depth of 2 to 4 mm. The sand, held in place by centrifugal force, had previously been preheated to 100 C (212 F) so that it would be dry and flow readily. It was found that if the sand layer was much greater than 4 mm there was too great a fusion of sand and steel. If it was thinner than 2 mm, steel would fuse to the steel mold.

The entire centrifugal casting machine is then rotated vertically through an angle of 5° from the horizontal with the pouring end elevated. Molten steel is weighed in a ladle and then poured into the revolving mold. The mold continues

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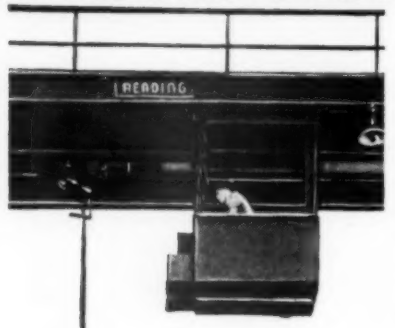

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to revolve until the casting cools to 1000 C (1832 F), at which time the centrifugal action is stopped. The machine is then lowered to the horizontal position and the tube pulled out of the mold. As the tube is removed from the mold an auxiliary electric motor mounted on the machine rotates the mold slowly to assist the removal of the tube. The tube is removed by running a mandrel through the tube and hooking onto the tube at the pouring end.

The spout does not enter the tube but stops at the mouth of the tube. In some cases an insulated mouthpiece is placed at the entrance of the tube to allow for an easy flow of the metal. Tubes can be produced one every 15 minutes for small to medium diameter size.

An exhibition run was made on a tube machine at Ruhrstahl Annener Gusstahl Werke. A 10.3-ft tube, 232 mm (9.3 in.) OD and 165 mm (6.6 in.) ID was made. Pouring time was 35 seconds and the total spinning time including the pouring time was 4 minutes. Total time from pouring to the removal of the tube was 8½ minutes. It was claimed that the average time for a complete cycle on production basis was 12 minutes.

Larger tubes of similar cross section could be cast in a complete cycle of 20 minutes. Tubes of approximately 3 tons in weight require 50 minutes prior to removal from the casting machine. Wall sections as thick as 450 mm have been produced centrifugally. The average length of the tubes is 3 m (approximately 10 ft). Tubes 5 m (approximately 16½ ft) long have been made, and experimental work on tubes 6 m (approximately 20 ft) long was underway. Minimum wall thickness for 5-m tubes is from 15 to 20 mm. Tubes from 8 to 20 in. OD and 10 to 20 ft long can be produced. Smallest possible inside diameter is 2½ in.

The management at Ruhrstahl Annen exhibited sections of tubes which had stainless steel inner and outer layers with the major portion of the cross section being carbon steel. The bond between the stainless and carbon steels was very good.

The same mold thickness is used (40 to 50 mm) regardless of the wall thickness of the tube, since water cooling is relied upon as the cooling medium. Water entered the jacket surrounding the mold at normal city water pressures. The temperature of the out-flowing water was kept below 60 C (140 F).

A 120-hp motor was used for revolving the mold. Speeds were figured as to the number of revolutions the inside diameter of the tube made.

	ID, mm	RPM
Large tubes	450	1400
Small tubes	100	1200

The finished tolerances were 6 to 10 mm on the outside of the tube and 5 to 20 mm on the inside. For gun barrels a 20 mm allowance was provided on the inside. A maximum of 2000 tubes can be cast in a single mold if the wall section of the tube is less than 20 mm. A mold life of 500 tubes is considered as the minimum.

Tubes fail because of heat cracking. Most of these cracks appear at the pouring end of the mold and if they are small they can be repaired by welding. Cracks were not removed by boring out the molds to larger diameters as they were only of sufficient wall size when constructed to permit a normal degree of safety. If the tube wall was approximately 100 mm a maximum of 500 tubes could be expected from the mold.

Scrap Is Low

Approximately 2 per cent scrap was obtained if a number of tubes of similar diameter were being produced. Most scrap occurred on the larger sizes. Hot tears caused by mold resistance resulted when the steel ran over the tube ends, and cold shuts resulting from interrupted pouring made up the greater part of the 2 per cent rejections. The management of Werke Hochfrequenz Tiegelstahl claimed that there was no solidification of the inner surface of the tube prior to progressive solidification from the outer wall inward, even though the tube had a 450 mm inside diameter and 100 mm wall section. No banding segregation caused by irregularities in pouring were found. The only defect occurring from this condition was hot tears.

Two machines, one for the United States government and one for the British government were liberated from the Bochum Verein, Bochum, for removal to their respective countries. The use of the sand lining as developed in Germany was new to the Allied governments and is regarded as an important contribution to the method of centrifugal casting of steel.

Horizontal Spindle—Permanent Mold Machine—The Germans produced cylinder liners for aircraft and automotive requirements by centrifugal casting methods. Liners weighed up to 60 lb. The machines were developed and built by the Deutsche Edelstahlwerke. The machine, sketches of which are shown in Figs. 1 and 3 and in the photographs of Figs. 6 and 7, consists of a frame for transporting the molds to and away from the rolls on which the molds rest in a horizontal position. The rolls are turned by a 10-hp compressed air-driven motor or by an electric motor. The top roll, as shown in the illustrations, is used to keep the mold from jumping off the two motor-driven rolls. The cylindrical

mold lifts out of the machine similarly to that employed in this country. Elevators at each end of the truck assist in positioning the molds. The casting slips out of the mold easily, after which the mold is given a new dressing and placed in the lower portion of the rack for reuse. The pouring spout is retractable and the lip enters about half-way into the mold when in pouring position. As soon as the mold is poured the spout is swung out of the way. The machine is very rugged and simple in construction without complicated gearing.

The molds, made of gray iron and not water cooled, are given a graphite-clay coating prior to pouring. Life of the mold was approximately 500 liners.

Induction furnace steel is tapped into a hand ladle according to a volume measure. The mold is rotated on the machine rolls. Timing of operations by the author on an exhibition run showed that 50 seconds were required to transport the metal from the furnace to the machines, during which time the machines were coming up to 800 rpm; 10 seconds were required to pour the casting. The casting rotated 1 minute 15 seconds after pouring before it was stopped and ejected from the machine. Rotation is continued until the casting freezes. The operator watches the color of the inside of the tube and uses a color change as an indication of solidification of the steel. The complete operation cycle requires 2¼ minutes. Normally, when three machines are in operation, the time cycle is 1 minute 20 seconds with 45 seconds allowed for solidification of the casting. The steel used for cylinders was a chromium-vanadium steel of 0.30-0.40 per cent carbon content.

The principle of casting liners is similar to that developed by Hurst in England and employed in the United States for the production of automotive cylinder liners. The chief advantages of the German design is (1) the use of air pressure for driving the rolls, (2) the rugged construction of the unit, (3) the simple cylindrical shape of the mold, and (4) the removal of the mold from the machine after each cast which gives excellent control over the mold temperatures and permits the application of an effective dressing.

Vertical Centrifugal Castings — The vertical centrifugal casting of gun barrels in quantities was carried on by the Germans at Buderuis Eisenwerke, Witzlar and at Skoda, Pilsen, Czechoslovakia. Barrels of from 2 to 4 m (6.5 to 13 ft) in length were produced in quantities, and barrels of 6 m (19.5 ft) were produced experimentally. These guns were produced to fire 75 mm shells. Approximately 350 tons per month of guns were

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produced at Buderuis from three machines, and a like quantity at Skoda. The largest number of guns produced in one month at Buderuis consisted of approximately 450 tons.

The centrifugal casting machines were driven by electric motors, the driving mechanism being located at the base of the machine and housed in a concrete pit. Base of the cast iron mold was bolted to the base of the revolving table unit. The mold was maintained in a true vertical position by two sets of adjustable rollers attached to the pit walls and rotated on roller pads on the mold located near the top and middle of the mold. There were four rollers at each position. The position of the rollers could be adjusted, so that various sized molds could be used, and the machines were capable of revolving 20 tons of mold and casting at speeds from 100 to 1500 rpm.

Molds for the gun castings were heavy walled. For the 4-m long casting a mold of approximately 16 tons was required to produce a casting weighing 1.6 tons. The ratio of wall thickness of casting to wall thickness of mold was approximately 1 to 6-8. The mold walls were tapered with the heaviest section at the gun breech positions.

The molds were coated lightly with a wash consisting of finely pulverized quartzite, 6 per cent Al_2O, and 2 per cent bitum. The bitum was purchased in either liquid or solid form from Habner Bergbau, Dortmund, and is a derivative of bituminous coal. The wash had a maximum grain size of 0.001 mm and prevented the castings from fusing to the mold walls. The bitum is volatile and the gas creates a reducing atmosphere which, according to company officials, prevents the particles of splashed steel from oxidizing.

A pouring or runner box is securely fastened to a cover plate located over the top of the mold. The runner box was lined with rammed chamotte and contained a baffle to act as a slag trap.

Steel is poured from a bottom pour ladle into the basin in the runner box, runs under the baffle and down a funnel spout into the mold. The funnel spout is 3 in. long and 1⅛ in. in diameter. Lining of the funnel consists of a sleeve of 3/16-in. thickness, and the opening through which the metal runs is ¾-in. Base of the mold is rammed with a chamotte plug.

The primary precaution in pouring the mold was to make certain that the stream of metal retained the form of a column of steel from the pouring spout to the bottom of the mold and that it fell directly in the center of the mold. Interrupted streams caused undue splatter which resulted in shot steel adhering to the mold walls. The mold was revolved at 200 rpm during the early part of pouring, while the mold was filled approximately one-third its length. By the time pouring was complete the mold was operated at 1400 rpm. A counter recording in revolutions per minute was installed on the control panel.

Pouring time was 3 to 4 minutes. The spinning time after pouring was approximately 15 minutes, or until solidification of the steel was complete. The total time from the beginning of pouring until the casting was ready to be removed from the mold was about 24 minutes. Temperature of the casting at the time it was removed from the mold was approximately 750 C (1832 F). The gun castings were then placed in a sand pit where they were permitted to cool slowly for 100 hours. Temperature of the casting when it was removed from the sand pit was 200 C (392 F). Heat treatment of the tubes after rough machining consisted of quenching and tempering. The medium manganese steels were water quenched and the nickel-chromium steels were oil quenched.

Turned and Bored

Finish requirements for machining permitted 10 to 15 mm on the outside surface. This was certainly necessary in view of the large and prominent amount of porosity covering all outside surfaces. The center of the gun was bored out. Only approximately the upper third of the gun contained a hollow central portion. This opening was circular in cross section but in length was parabolic in shape. The only tubes which could be made with a cast hollow bore were those of 2 m (6.5 ft) or less in length. Such tubes in the as-cast condition had a wall section of 3 in. at the base of the tube and a 2-in. section at the top of the tube. The 6-m guns in the as-cast condition had a breech 12 in. in diameter and a nozzle of 7 in. diameter. Diameter of the opening at the nozzle was 3 in.

It was stated by company officials that the forging weight for the 4-m (13 ft) guns was 2200 lb whereas the centrifugal casting weighed 1540 lb. The weight saving was directly reflected in machining in view of the 660 lb of steel that did not require removing. Scrap rejections were approximately 5 to 6 per cent.

The vertical method of casting gun barrels did not appear as successful a method as the horizontal method of casting as developed by Dr. Pultzguter. Mechanical properties of the barrel, however, were as good as those of the horizontal casting.

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the vertical centrifugal machines could be the production of ingot molds and railroad freight car axles.

Semi-centrifugal Castings—Centrifugal casting of sand molds on turntables operated by a vertical spindle powered by variable speed electric motors in Germany was similar to that employed in the United States in steel foundries. Molds were made of cement-bonded sand or were assembled by the stacking of oil sand cores. The general method employed is to pour the molds while they are stationary and then spin them at speeds of from 200 to 500 rpm depending on the type of castings being produced. In all cases the principles of directional solidification are carefully observed. Excellently appearing castings were produced.

A wheel casting for tanks was studied in several ways in order to find the best method of producing a sound casting. The best static casting (Fig. 4) produced from quality-yield considerations was 340 lb total weight in the as-cast condition. By casting the wheel centrifugally a satisfactory casting was produced at 180 lb (Fig. 5). The machined finished casting weighed 100 lb. Considerable saving was made by casting these wheels on a vertical spindle, platform type centrifugal casting machine.

Note: The report "Centrifugal Casting of Steel In Wartime Germany" is taken from a 149-page report on "The German Steel Casting Industry," by C. W. Briggs and M. T. Ganzauge, for the Technical Industrial Intelligence Committee. Copies may be purchased in either microfilm or photostat form from the Office of Technical Services, Department of Commerce, Washington.

BOOK REVIEW

Wood Patternmaking, by Herbert J. McCaslin; 366 pages 5 x 7¼ in.; published by McGraw-Hill Book Co. Inc., New York; available through Penton Publishing Co., Cleveland, for $2.60.

This is the fourth edition of a book originally written while the author was patternmaker instructor, industrial department, William L. Dickinson High School, Jersey City, N. J. The new edition provides a high degree of teaching effectiveness and supplements information that the student may acquire by observation. The text is divided into two parts and embraces 64 pattern lessons and 410 illustrations. New material includes examples of match and follow board work, application of cap core, skeleton pattern construction, core frame setups for molds to be assembled from dry sand bodies, corebox and mold arrangement for the casting of interlocking members, efficient use of machine tools, inspection, checking and recording of patterns, expanded glossary of patternmaking and molding terms. The text is intended to supply adequate teaching material for a period of six semesters.

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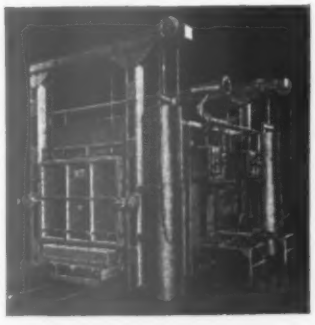

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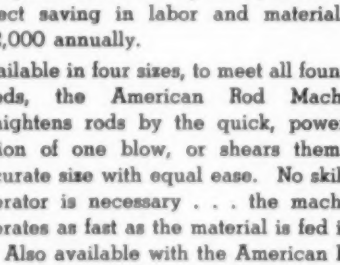

Actual installation photograph showing the American Core Rod Straightener Machine in action.

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NEW TRADE PUBLICATIONS . . .

PERMANENT MOLDS: Eaton Mfg. C., Foundry Division, 9771 French Rd., Detroit 13, has published a picture book giving a comprehensive story of the permanent mold process. Preparation of the molds from drawing board to the finished and tested mold is shown in detail. A series of pictures shows the process of producing gray iron castings without the use of pressure in a permanent mold machine. A discussion of the physical and mechanical properties of permanent mold gray iron castings and suggestions for designing products for this process complete the booklet.

FLOOR MACHINE: Bulletin of G. H. Tennant Co., 2530 Second St. North, Minneapolis 11, describes a disc type floor machine for polishing, scrubbing, steel wooling, rug cleaning, etc. Machine is less than 12 in. high, operates flush with walls and provides concentrated or divided weight operations through adjustable wheel assembly.

AIR HEATER: J. O. Ross Engineering Corp., 350 Madison Ave., New York 17, has issued a 16-page bulletin No. 135-A concerning oil or gas fired direct and indirect air heaters for use in finishing, heat treating, processing and drying. The bulletin is illustrated and includes charts, diagrams and tables covering operating principles, construction, nominal heating ratings, capacities and applications of various types.

CHEMICALS: Hercules Powder Co., Dept. HP, 999 Market St., Wilmington 99, Del., offers a booklet listing chemicals and industrial explosives. Chemicals discussed include the cellulose family, rosin family, synthetic resins, terpene solvents and chemicals, chlorinated products, explosives, blasting supplies, sporting powders and special products.

COUPLINGS: Crocker-Wheeler Division, Joshua Hendy Iron Works, Ampere, N. J., offers bulletin No. SL-1000-1 describing its resilient, flexible couplings. Power is transmitted through the coupling by six synthetic rubber balls which transmit torque, absorb shock and vibrations, yet do not transmit end thrust.

GRAPPLE: Hayward Co., 50 Church St., New York 17, has published illustrated bulletin No. 802 containing information on grapple devices for many diversified special services, including the handling of such materials as pulp wood, rock, scrap iron, heavy trash and sugar cane.

DEVELOPER, PRINTER: Charles Bruning Co. Inc., 4754 Montrose Ave., Chicago 41, offers two leaflets covering their developer and printer. These machines make prints with black, red or brown lines on white or green tinted backgrounds.

HEATING UNITS: Salem Engineering Co., Salem, O., offers a 16-page booklet on "Engineered Heat." It contains descriptive information on circular soaking pits, heating furnaces and auxiliary equipment, as well as a number of installation pictures, tables and charts on temperature conversion and thermal efficiency of fuels.

DIAMOND TOOLS: Precision Diamond Tool Co., 102 South Grove. Ave., Elgin, Ill., has published a 20-page catalog containing engineering data on the proper application of diamond tools. How to do a good grinding job in the shortest time and the use of diamond dust are explained. Data on the use of diamond grinding wheels and wheel dressers are given, and are reprinted as a wall chart which will be furnished on request.

CLAMSHELL BUCKETS: C. S. Johnson Co., Champaign, Ill., has published an 8-page booklet describing its line of clamshell buckets. Complete specifications covering capacity, weight, dimensions and cable data of the company's general purpose, wide rehandling and heavy duty digging clamshell buckets in sizes from ⅜ to 2½ yd are included.

BUYING GUIDE: Designed to be of help to the processor in all fields is a new 16-page bulletin No. 25B6177B, "Buying Guide of Allis-Chalmers Equipment for the Process Industries," released by Allis-Chalmers Mfg. Co., Milwaukee 1. The booklet features a series of thumbnail "buying guides"to help in making preliminary selection of any of a complete range of industrial products including motors, motor controls, power generation and distribution equipment, vibrating screens, feeders, washing equipment, pumps, crushers, grinding and roller mills, pyro-processing machinery, blowers and compressors, V-belt drives, electronic heating and welding equipment.

REFRACTORIES: Chas. Taylor Sons Co., Dept. C, Cincinnati, offers bulletin No. 201 describing zircon refractories for high temperature service and special applications. The bulletin is said to be the first complete outline written on zircon refractories and their application to various industries.

MICROFILMING: Recordak Corp., subsidiary of Eastman Kodak Co., 350 Madison Ave., New York, in a new booklet tells the story of microfilming in business and industry, and its uses for preserving valuable records, saving costly storage space, speeding up reference to office records and for making facsimile prints of files on film. Descriptions of equipment explain how documents are photographed on 16 mm film and an enlarger, suitable for making facsimile prints of drawings on the spot, is also described.

WATERPROOFING: Truscon Laboratories Inc., Caniff & Grand Trunk Railroad, Detroit 11, has published a specification book of waterproofings, dampproofings and concrete specialties, complete with illustrations and description of products. Waterproofings, including integral and iron processes, dampproofing, covering clear and bitumious types, and a miscellaneous section consisting of transparent membrane method for

curing concrete, swimming pool coatings, paint for damp walls, shrink proof mortar, admixture for bedding machinery, etc., are described in the book, "A".

GAS MASKS: Mine Safety Appliances Co., Braddock, Thomas & Meade Sts., Pittsburgh 8, in a bulletin No. ED-11, describes and illustrates industrial gas masks for protection against individual gases, smokes, vapors, and dusts (with the exception of carbon monoxide and illuminating gas.) All-vision facepiece models are available with speaking diaphragm for communication. For safety in low concentrations of poisonous and irritant gases, fumes, and dusts, a canister-type half mask model is obtainable.

ELECTRODE CHART: Air Reduction Sales Co., 60 East 42nd St., New York 17, has published a graphic 25 x 40 in. electrode selection chart which specifies which electrodes to use, shows currents, gives mechanical properties and includes a color guide showing electrodes in their actual color. Included are electrodes for mild, alloy, and stainless steel, nonferrous metals, cast iron, hard-facing and special purpose rods.

FOUNDRY MODERNIZATION: Lester B. Knight & Associates Inc., 120 South La Salle St., Chicago 3, has prepared a bulletin entitled "Foundry Modernization," which describes organization, procedures, costs, and facilities for modernization and mechanization of foundries to assure management, labor and owners an adequate return for their efforts and investment. Engineering services offered by the company are also described in the circular.

GRINDING: Norton Co., Worcester 6, Mass., offers Form 1405-IP-5-46-1OM, which contains 32 pages of information covering grinding wheels, mounted points and wheels, cut-off wheels, core files, rubbing bricks and wheel dressers for use in foundry operations. Specifications for wheels and jobs for which they are adapted, price lists of popular sizes, and suggestions for materials best suited for specific jobs, are contained in the booklet.

MATERIAL HANDLING: Boyer-Campbell Co., 6540 St. Antoine St., Detroit 2, has published a 4-page catalog completely describing a new cam-lever mechanism and chain that grabs up heavily laden steel barrels, steel plates, sheet stock, etc., and holds it in a vice-like grip that grows tighter the heavier the load. Specifications and prices of two models, a single strand and a double strand chain unit, are given. A 4-strand model also is available.

PROTECTIVE COATING: Prufcoat Laboratories Inc., 63 Main St., Cambridge 42, offers an 11-page booklet describing a new protective coating for concrete, structural steel, floors, tanks, pipes and machinery which provides positive protection against acids, alkalies, oil and water. The coating cuts maintenance cost where corrosion is a serious problem and may be used on exterior surfaces exposed to dry heat up to 300 F. Made from a special combination of synthetic resins and inert pigments, it is

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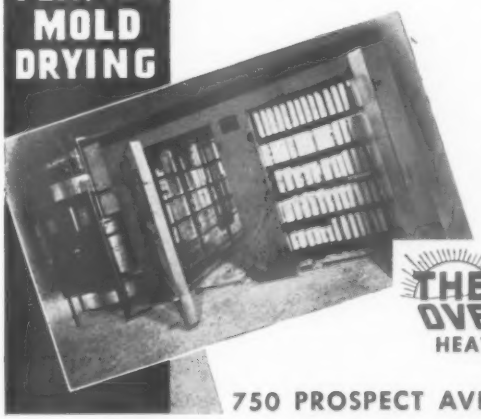

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applied by brush or spray gun and dries by evaporation of volatile solvents. It is available in a variety of standard colors.

SAFETY TOOLS: Ampco Metal Inc., Milwaukee 4, has issued a new catalog describing their line of safety tools. Such tools are for use in the presence of explosive liquids, fumes, gases and dust to prevent fires and explosions which may be caused by sparks from steel tools.

LADDER SHOES: American Optical Co., Safety Division, Southbridge, Mass., is distributing a circular describing a new type of ladder shoe which fits all standard ladders, designed to provide maximum safety on all kinds of surfaces. Block style shoes are recommended for ladders used on floors of metal, slate, tile, marble, concrete and wood. Point grip shoes are available for ladders used on wood block floors, bare ground and soft or icy surfaces.

CONTROL VALVES: C. B. Hunt & Son Inc., Salem, O., offers Bulletin 107, containing factual data concerning control valves. It contains complete descriptions and illustrations of operating units for machine designers, including air, hydraulic, descaling, and single plunger valves, swing, rotating and ball bearing joints, valve and hose couplings and roll cooling equipment.

CONSERVATION SYSTEMS: Gale oil Separator Co. Inc., 52 Vanderbilt Ave., New York 17, has published a 4-page circular containing descriptive data on its line of interceptors and separators, neutralizer and cleaning system. Installations showing units for clarifying large water flows, neutralizing pickling liquor waste from vats in copper and magnesium extrusion plants, for cleaning oil from grinding machines, as well as an oil recovery system, are shown.

PYROMETER: Bulletin 232, published by Bailey Meter Co., 1050 Ivanhoe Rd., Cleveland 10, describes and illustrates a new potentiometer pyrometer, an electronic type instrument for difficult temperature control problems. General specifications, diagrams and installation sketches show the details of operation of the instrument, which may be used with primary elements other than thermocouples for measurement of speed, smoke density, turbidity, light or color, and vacuum.

DUST COLLECTOR: Ideal Industries Inc., Sycamore, Ill., in a 4-page circular recently published, gives descriptive data covering a dust collector easy to install on grinders, buffers, sanders, polishers, lathes and other machines where dust is a problem. A wide selection of standard hose, couplings and nozzles facilitates installation on most machines. Specifications and cross-cut photograph showing details of operation, are included.

PATTERN WOOD: Western Pine Association, Portland 4, Oreg., offers two bulletins on best grades of wood for foundry patterns, published to assist patternmakers in the choice of lumber best fitted to their needs. These booklets on Idaho white pine and sugar pine describe grades of wood, sizes and qualities, proper seasoning and care of stock, as well as mechanical and physical characteristics required of pattern woods.

PROCESS CONTROLLERS: Bailey Meter Co., 1050 Ivanhoe Rd., Cleveland 10, has issued illustrated bulletin No. 17 describing process controllers, control components, measuring components and instrument combinations. Application data such as sizes, pressure standards and ranges are listed for the various components. Typical control systems of both single and multiple element types are illustrated.

TESTING MACHINES: Bowser Inc., Refrigeration Division, Terryville, Conn., announces a new series of illustrated data folders covering laboratory and production testing machines which simulate altitude conditions including subzero, cold, relative humidity and vacuum conditions.

KODAK DATA BOOK: Third revised edition of the Kodak Data Book on formulas and processing has been published by Eastman Kodak Co., Rochester 4, N. Y. New section on negative faults and the formula for the new Kodak Quinone-Thiosulfate Intensifier IN-6 for use with weak negatives have been added.

MATERIAL HANDLING: American Hoist & Derrick Co., St. Paul 1, has published a new general catalog describing its line of equipment which includes marine deck machinery, revolving cranes, pile drivers, ditchers, locomotive cranes, cane handling machinery, material elevators, steel derricks, hoists, car pullers, winches, blocks and sheaves and wire rope clips.

AIR CYLINDERS: Hanna Engineering Works, 1765 Elston Ave., Chicago 22, offers catalog No. 234 giving specifications and operating data for air cylinders, valves and high pressure hydraulic cylinders.

ELECTRODES: Jessop Steel Co., Washington, Pa., has issued a booklet containing information on the selection and application of stainless electrodes for welding stainless steel. Charts are shown giving the analysis of material to be welded and of the weld metal deposit. Current range is furnished for each type of rod in varying diameters.

FLOOR TREATMENTS: Truscon Laboratories Inc., Detroit 11, has issued Specification Book "B" covering floor treatments for concrete and wood. The booklet contains both complete and "short" specifications, illustrations and a description of the product. It is divided into five sections: "Integral" hardeners, chemical hardeners, concrete dye, surface coatings and wood floor preservatives.

GRINDING WHEELS: Mid-West Abrasive Co., Owosso, Mich., offers a 94-page booklet, "Grinding Wheel Information," which gives a history of grinding wheels and explanations of grain sizes, types and fundamentals of grinding wheel operation. It contains specification data, a chart of recommendations and is illustrated with cross-sectional views of grinding wheels and honing stones.

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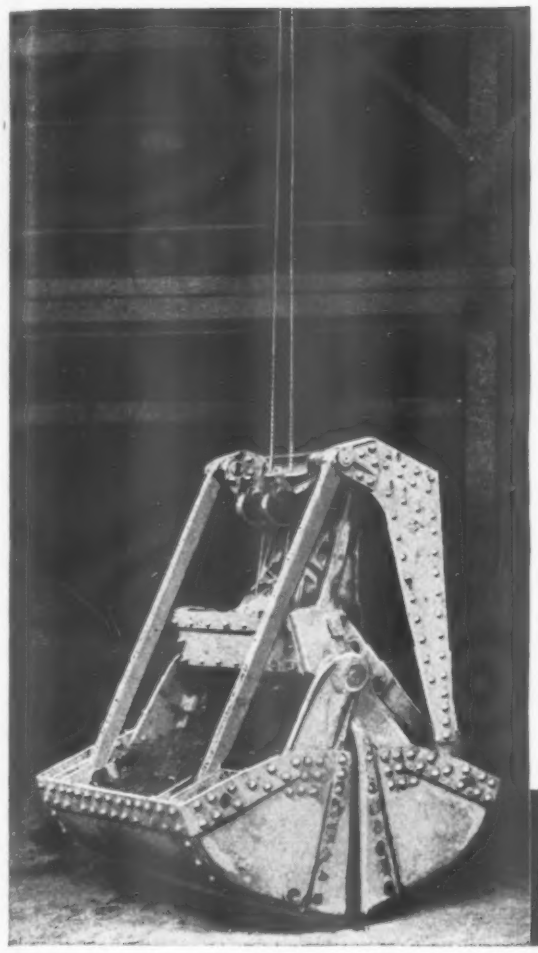

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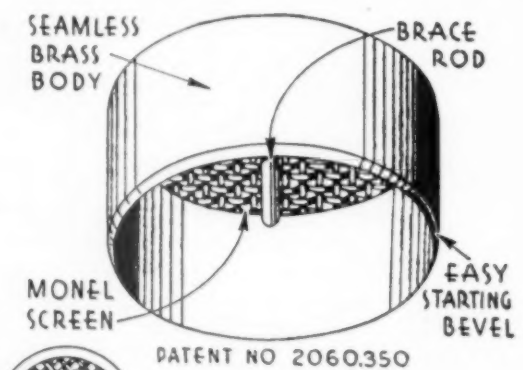

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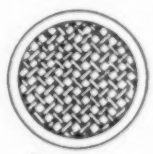

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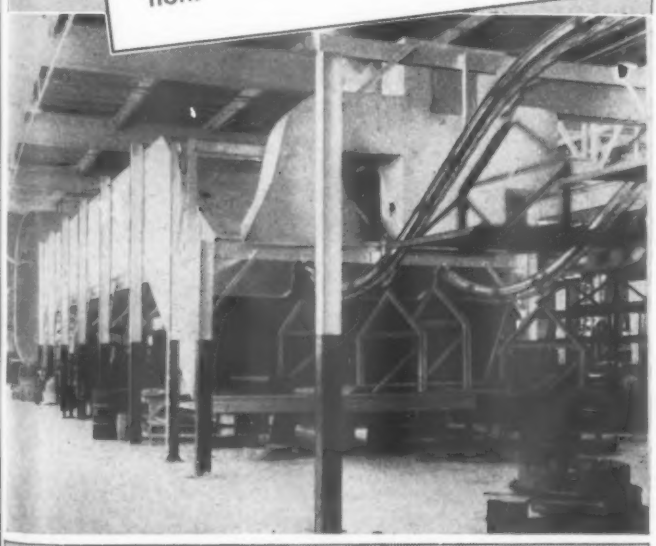

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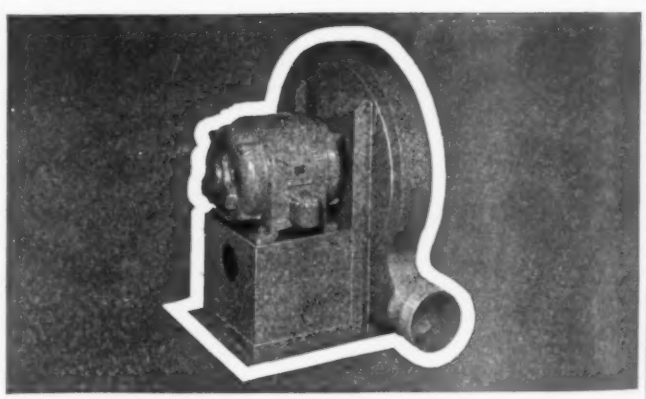

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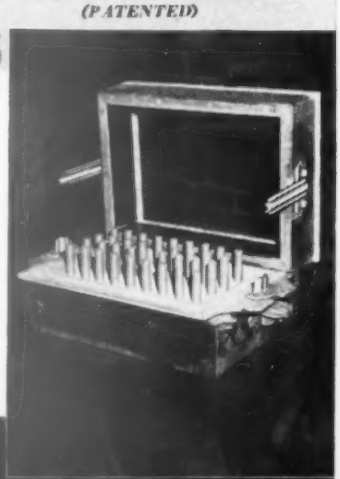

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Pin, slide and match plate lugs are interchangeable, no need to realign if replacement is required.

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This machine is furnished in two sizes: 10" squeeze cylinder with 3" jolt cylinder and 12" squeeze cylinder with 4" jolt cylinder.

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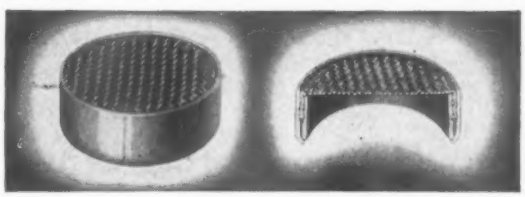
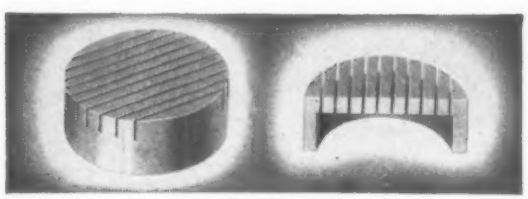


SCREEN TYPE—Patent No. 2,263,974

For HIGH-SPEED production. Made from 30 mesh monel screen lapped 3/16" over brass innertube and firmly secured with brass outertube, making a strong, fool-proof unit. Each vent is sized through a die assuring accurate fit. The compression between outer and inner tubes holds screen securely in place without slightest danger of blow-out. Costly work stoppages to repair or replace vents are eliminated.

Use Rienacker core vents (screen type) whenever possible—on all flat surfaces, and on curved surfaces wherever core marks are unimportant. You get fastest air escape with minimum liability of clogging.



SLOTTED TYPE—Patent No. 2,238,506

For CONCAVE and CONVEX RADII. Made of brass, precision slotted for greatest air escape possible with this type of vent. Standard slot width for cast iron .014; for brass .010. Core vent hole should be made with a step-drill so that bottom of vent rests on shoulder thus provided. This slotted vent is easily shaped to any curved surface; leaves no core marks on casting.

• • •

Write for information and prices on gas escape vent bushings for use with round or rectangular vent rods. Round bushings in all drill rod sizes; rectangular bushings: 3/32" x 1/4"; 3/32" x 3/8"; 1/8" x 1/4".

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When the mold, *shown above*, came from the foundry of B. F. Goodrich Company, Akron, Ohio, there was a dangerously thin section right at the steam entrance and exit ports.

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And they were . . . *with Ni-Rod!*

Here's how the repair was made:

The thin section was cut away until sound metal of at least 1/4" thickness was found at all boundaries. A steel patch plate was fitted into the opening. All edges were beveled.

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Were the welds non-porous?

Yes, sir! Tests at 200 psi. water pressure and at 100 psi. steam pressure disclosed no leakage.

And, there was no distortion to spoil the mold's shape.

You can't beat Ni-Rod for quick, easy and dependable repairs on cast iron. Works on A.C. or D.C. Be sure your plant always has Ni-Rod on hand . . . available in 1/8", 5/32" and 3/16" diameters.

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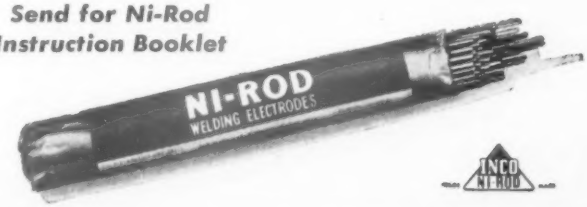

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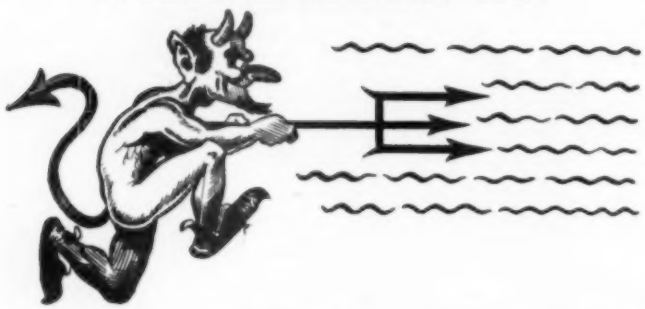
for Ferrous and Non-Ferrous Metals



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Keeps metal molten 50% longer in heads and risers. This is accomplished by retarding solidification by Exothermic Reaction. SOFFEL'S CARBON-FREE LIQUIDIZER kicks sluggish metal back to fluidity and life, keeps it that way by its insulating properties, and keeps heads and risers open and fluid. As a deoxidizer, when added in the pouring ladle, it removes occluded gases, increases the tensile strength and transverse, and REMAINS A POWDER, which is easily skimmed off. Free samples furnished in continental United States and Canada.

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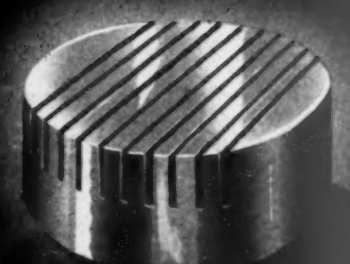

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Here's part of a complete line of DEMMLER core box vents—rigidly constructed in varying sizes of slotted brass—slotted steel—and screen mesh. Orders filled promptly from stock!

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Slot widths: .010", .013", .015"
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Slot widths: .010", .013", .015"
Diameters: 1/8", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1", 1 1/4", 1 1/2"

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Mesh: #30, #40, #50.
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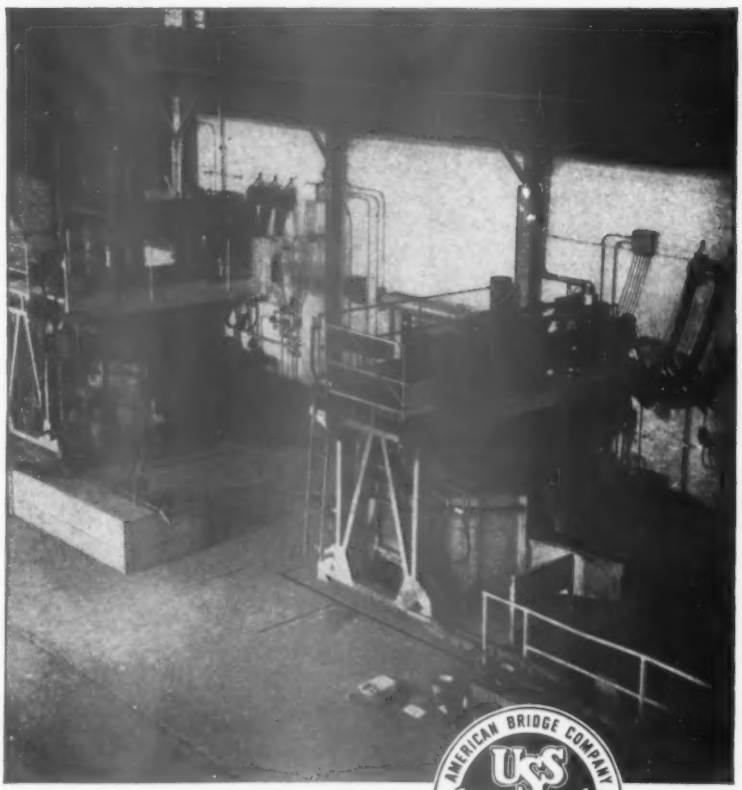

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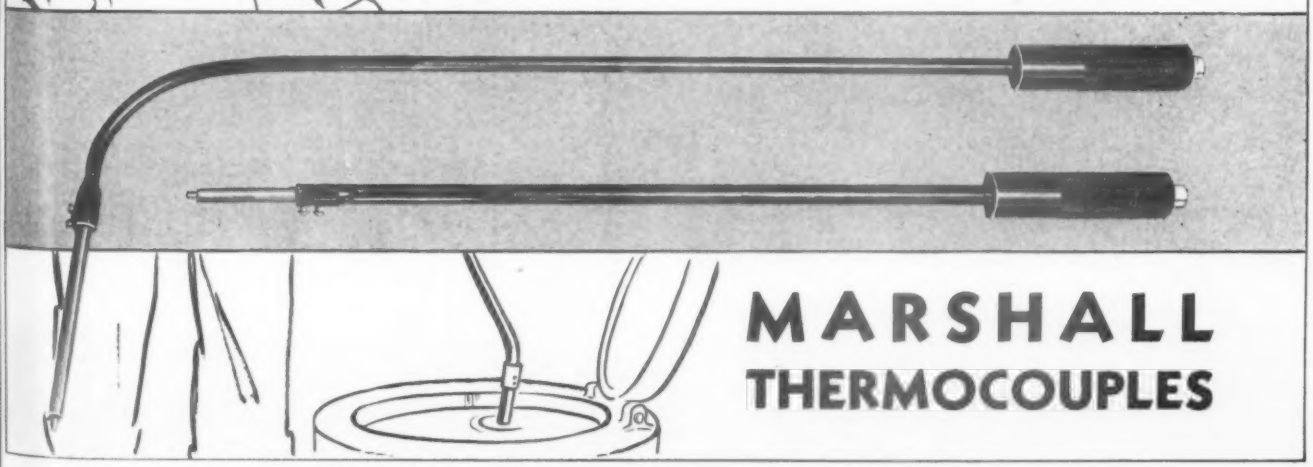

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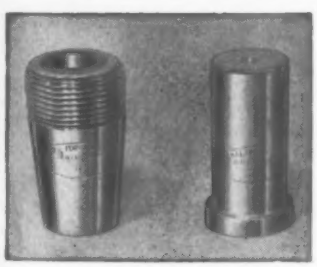

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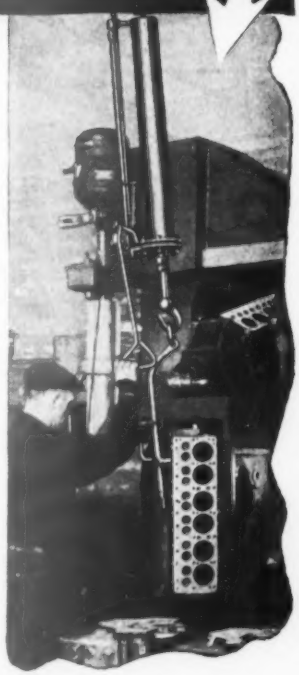
CUT PRODUCTION COSTS
with **CURTIS**
AIR COMPRESSORS AND AIR HOISTS



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MODEL M

This machine accommodates both metal molds and flasks for sand molding.

Continuously variable speed control using standard AC power.

Built in six sizes for castings from 1½" O.D. to 16" O.D. and up to 48" long.

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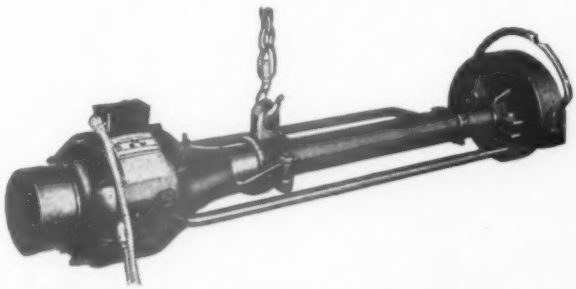
The combination of direct drive from motor to wheel and simplicity of construction accounts for far greater durability and dependability than can be expected of a machine with flexible shaft drive. That, in turn, means it is more economical.

For further details and specifications, write to:



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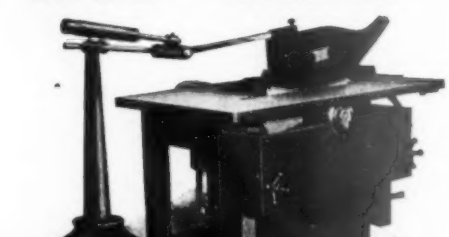
"OLIVER"
No. 45 Hand Feed
RIP SAW



Unequalled for ripping light stock as well as heavy timbers and lumber skids. A sturdy, powerful tool with vertically adjustable table 3 feet wide and 5 feet long. Carries saws up to 26-inch diameter to saw stock to 9 inches thick and 26½ inches wide. Saw is well safeguarded.

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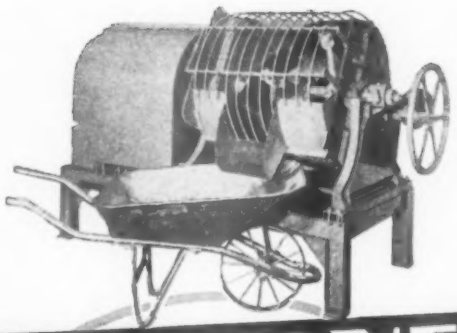

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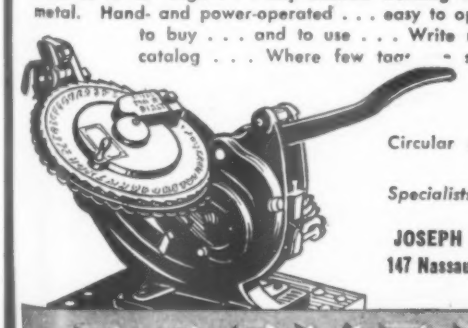

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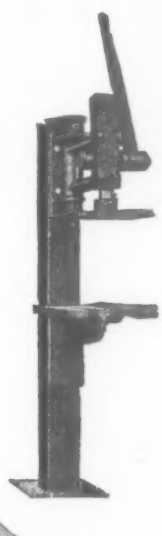

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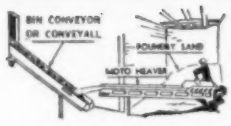

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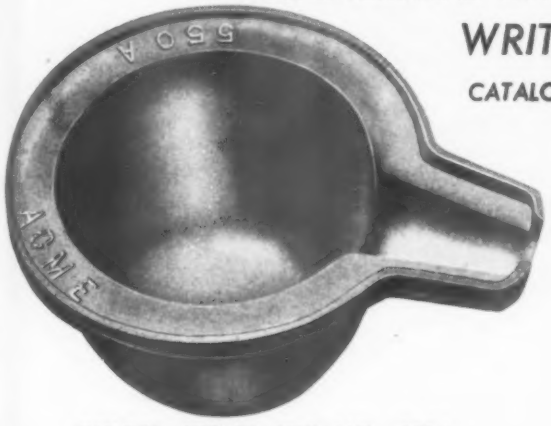

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WITH 1½" COLLAR ON FLANGE

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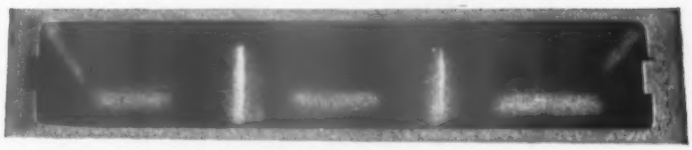

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1. Foundry Terms

Penton Publishing Co. — 32-page booklet "Glossary of Foundry Terms" contains alphabetical list of definitions of terms and phrases commonly used in the foundry industry. Booklet is compiled by Edwin Bremer, metallurgical editor of THE FOUNDRY.

2. Industrial Power Trucks

Mercury Mfg. Co.—48-page illustrated vest pocket sized bulletin No. 201 presents full line of tractors and trailers, fork trucks, platform lift trucks and burden carrier trucks. Operating advantages and functional principles are given.

3. Air Cylinders

Hanna Engineering Works—26-page illustrated catalog No. 234 gives complete specifications and operating data on line of air cylinder and lists 1001 possible applications for these units in foundry industry.

4. Core Racks & Wheel Dressers

Western Tool & Mfg. Co.—Two illustrated data sheets Nos. 48 and 47 cover adjustable steel core racks and Champion grinding wheel dressers respectively. Double and wall type racks are available. Specifications of both products are included for reference.

5. Fire Box Coatings

Johnson Fuller Co.—4-page illustrated folder "Vitrobond and Vitrobasic" discloses information on two highly refractory, self-vitrifying, high temperature furnace or fire box crucible coatings made from zirconium silicate base. Methods of application and characteristics are presented for both coatings.

6. Core Stripper

K. F. Zurn—6-page illustrated vest-pocket sized folder gives specifications, engineering data and operational information on Quikdraw core stripper. Unit is employed for production of hand-made cores with machine-made speed and accuracy.

7. Air Compressors

Curtis Pneumatic Machinery Div., Curtis Mfg. Co.—Compilation of seven illustrated multipage bulletins presents factual data, engineering specifications and installation information for single and two stage, U-type air compressors, air tanks and accessory fittings and equipment.

8. Protective Equipment

American Optical Co.—4-page illustrated folder "Body Safety Guide" presents chart giving classification of industrial hazards. Protective equipment to meet each hazard is illustrated and can be located and selected by use of chart.

9. Grinding Wheels

Simonds Abrasive Co.—128-page illustrated booklet "Grinding Wheel Data Book" deals with all types of grinding wheels. Information is given on cutting particles, grades of hardness, bonding medium, density, snagging wheels, safety codes, wheel speeds, instructions for mounting wheels and engineering data related to grinding.

10. Foundry Equipment

Allis-Chalmers Mfg. Co.—16-page illustrated booklet No. 25B6177B features series of buying guides to help foundrymen make proper selection of motors, motor controls, power generation equipment, vibrating screens, feeders, washing equipment, pumps, crushers, grinding and rolling mills, blowers and compressors.

11. Materials Handling

Rapids-Standard Co. — Illustrated folder features Rapid-Wheel conveyor, Wheel-Ezy hand truck and Rapid power boosters. Illustrations show typical foundry conveyor installations of such and individual specifications are included.

12. Aluminum Alloy

National Smelting Co.—14-page illustrated bulletin "Ternalloy" reveals information on aging characteristics and mechanical and physical properties of Ternalloy when sand and chill cast. Advantages include high strength without recourse to heat treatment, dimensional stability, excellent machinability, corrosion resistance and pood polishing characteristics.

13. Research Service

Pittsburgh Testing Laboratories—28-page illustrated booklet gives detailed discussion on independent fact-finding functions such as testing of materials and research into nature of substance as well as routine physical and chemical analyses of all kinds.

14. Flexible Couplings

American Flexible Coupling Co.—32-page illustrated catalog "The American and Amerigear" reveals application data on series A, B, C, AM, BM and CM American flexible couplings and series GS, GH, GSM and GSS Amerigear flexible couplings. Misalignment, vibration and operational information are covered.

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15. Pneumatic Tools

Rotor Tool Co. — 44-page illustrated catalog "How to Cut Costs with Rotor Air Tools" presents factual operational data on grinders, drills, sanders and nut setters. Costs are compared for nine types of portable tool operations.

16. Flexible Couplings

Crocker-Wheeler Electric Mfg. Co.—4-page illustrated bulletin No. SL-1000-1 stresses design simplicity and increased operational life of line of flexible couplings. Shock absorbing capacities, torsional flexibility, lubrication and line-up information is presented.

17. Clamping Tools

Knu-Vise, Inc. — 16-page illustrated bulletin "Toggle Action Clamps, Pliers, Wrenches" is condensed compilation of company's general catalog. Descriptions and diagrams for each clasification of models produced are covered.

18. Alloy Iron

Meehanite Metal Corp.—4-page illustrated bulletin No. 23 presents data on Meehanite metal as used for permanent molds. Mold applications such as in production of metals, glass, plastics and rubber products are described.

19. Metal Cutting Saw

Machine Tool Div., Kalamazoo Tank & Silo Co.—8-page illustrated catalog No. 46 describes and gives specifications of Kalamazoo metal cutting band saw. Cutting action is continuous and unit has built-in off-the-floor coolant system. Wet and dry cutting speeds are charted.

20. Welding Rod Chart

Eutectic Welding Alloys Corp.—18 x 23-inch wall chart is compilation of factual information for proper selection of welding rods. Bonding and remelting temperatures and Brinell hardness are given for each alloy.

21. Air Heaters

J. O. Ross Engineering Corp.—16-page illustrated bulletin No. 135-A describes line of oil and gas fired heaters as source of clean hot air for drying and finishing operations on bodies and other parts. Foundry applications are stressed.

22. Refractories

Chas. Taylor Sons Co.—12-page illustrated bulletin No. 201 reveals information on refractories for high temperature service and special applications. Sizes available and specifications are presented for reference.

23. Chipping Hammers

Cleveland Pneumatic Tool Co.—12-page illustrated bulletin No. 75B covers chipping, calking and beading hammers for multipurpose foundry applications. More than 47 different sizes and styles are presented.

24. Electric Hoists

Lisbon Hoist & Crane Co. — 8-page illustrated bulletin "Bob-Cat Electric Hoists" gives specifications, features and price data on line of ½ to 2-ton capacity electric hoists. Weight, size, accessibility and strength are covered. Cutaway illustrations show operational features.

25. Foundry Equipment

Schmieg Industries—42-page illustrated brochure presents information on dust and fume control equipment, spray booths, mechanical washers, industrial ovens and sheet metal equipment and accessories.

26. Industrial Trucks

Service Caster & Truck Corp.—24-page illustrated catalog "The New Service MoTowLift Measures Up" describes industrial truck for wide variety of foundry applications. Units are gas powered, standard automotive designed, have maximum visibility and are powerful.

27. Abrasives

Norton Co.—32-page pocket-size booklet entitled "Norton Grinding Wheels and Other Products for the Foundry" describes B-5 resinoid foundry wheels, disks mounted points and wheels, cut-off wheels, core files, Crystolon rubbing bricks and grinding wheel dressers. Specifications and prices are given.

28. Core Machine

Newaygo Engineering Co.—Illustrated data sheet gives specifications and typical production record of Rappless core machine. Features are listed and price quoted.

29. Metallurgical Apparatus

Central Scientific Co.—24-page illustrated bulletin No. 76-A presents full line of laboratory apparatus and scientific instruments for use in metallurgical field.

30. Self Dumping Hoppers

Roura Iron Works—4-page illustrated folder includes construction and engineering data on self-dumping hoppers for wide range of foundry applications. Operational information and adaptability are outlined.

31. Magnetic Separator

Eriez Mfg. Co. — Folder presents information relative to magnetic separators for reconditioning of sand and elimination of iron and metal particles. Installation costs and specifications are included.

32. Material Handling Equipment

Abell-Howe Co. — 12-page illustrated catalog "Increase Your Material Handling Capacities" discloses information on Abell-Howe cranes and monorails having unlimited foundry use for material and equipment handling. Installation photos are included.

33. Oxyacetylene Processes

Air Reduction Sales Co.—30-page illustrated book "New and Improved Oxyacetylene Methods for Steel Foundries" contains descriptive information concerning Airco process. Advantages are demonstrated and pictured. Expanded use of oxygen lancing to start openings is described also.

34. Vibrating Screen

Robins Conveyors, Inc.—12-page illustrated bulletin No. 111-A lists features of Eliptex screens. Specific applications for dewatering, heavy-media dewatering, separation and screening are covered. Dimensions and clearances in single, double and triple deck types are listed.

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With 5 good reasons for its popularity

1. Because of its fracture resistant structure Cleanblast Alloy 99 shot is far superior to regular material, and will lower your consumption of shot by a large percentage.
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5. Cleanblast Alloy 99 shot fractures at a much slower rate and into much larger pieces than regular shot. This results in less dust and lower disposal costs.

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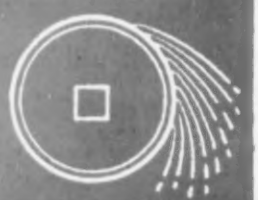

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Designed to meet the need of a suitable device for assisting in the production of hand made cores. Any small core box can be stripped as perfectly, without any special set-up or rigging, as is possible with the best rollover and draw core machine. The method not only produces perfect cores but completes the operation in less time than in any other way. Used by several hundred foundries. Contact us direct or your local supply house. Write for informative bulletin.

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Why permit profits to flow away because of casting rejects and the excessive remelting of riser metal?

The new and more potent

by its exceptionally exothermic action will produce sounder closely grained castings free from voids and gas pockets—castings that are readily machinable. CASTFLUX will speed up production, help you plug the hole in the barrel.

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Send us your trial order, minimum 200 pounds. Use CASTFLUX as directed. If it does not produce as claimed, material can be returned at no expense to yourself.

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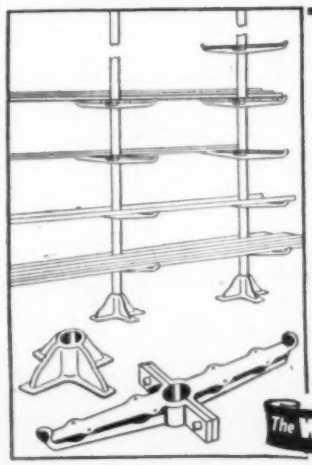

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Adjustable Rack

"The ideal racking equipment for core storage. Place plates or strips on these rugged cast-iron arms that bolt to 2" pipe and you have a level, solid shelf for both storage and drying. Arms are furnished single or double type and are adjustable to any required spacing and can run up to any height; and they are economical. You supply your own pipe and plates and purchase only the arms, base and ceiling collar. Write today for complete detail."

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ELECTRIC VIBRATORS

Assure FREE FLOWING Bins, Hoppers and Chutes

3600 powerful vibrations per minute eliminate arching and plugging of sand in bins and hoppers over molding stations, or in sand preparation systems.

Can be automatically controlled by gate. When gate is open, vibrator will operate. When gate is closed vibrator stops.

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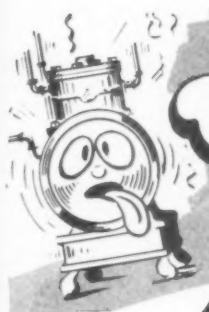
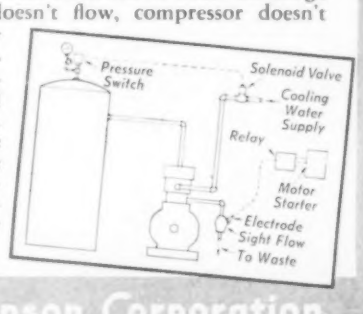


BEWARE OF thirsty Compressors

Avoid Overheating, Save Water with the Johnson Control

One way to avoid dangerous overheating of water cooled compressors is to let the water run continuously. The best way, which avoids such costly waste of water, is to use the simple, trouble-proof Johnson Compressor Control diagrammed below. Compressor doesn't start until water flows through it and completes circuit with electrode in water discharge pipe. If water doesn't flow, compressor doesn't start. If water flow stops, for whatever reason, compressor is stopped immediately. Same complete protection can be provided for unloading compressors. Write for bulletin.



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Rejection Averted

This casting is perfectly OK internally. But it came through with shallow surface holes that belied its soundness and might easily have failed to pass inspection. With Smooth-On No. 4 Foundry Cement the contours were trued up, and possible rejection averted.

For the past 50 years Smooth-On has been saving marred good castings in foundries all over America. It is easy and very inexpensive to use. As it hardens it expands a little and holds tight, becoming practically part of the casting metal, and may be filed or machined.

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●For light gray castings use Smooth-On No. 4AA. Fine grain, high metallic lustre. Machines perfectly. 1-, 10- and 50-lb. sizes.

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Entirely at our expense, you may make a conclusive test of Smooth-On on your own castings in your own plant. Just fill in the coupon and mail it. We'll send you also the popular 40-page, pocket-size Smooth-On Repair Handbook—over 1,000,000 copies already put in circulation.

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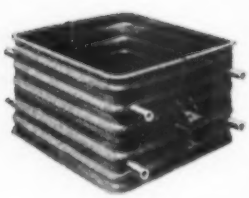

Get streamlined speed and efficiency in your foundry operations . . . use Truscon Foundry Flasks to assure more output of better quality, with fewer man hours. These sturdy steel flasks give you five important features: Light Weight, Strength Where Needed, Durability, Proper Shapes and Sizes, Easily Rammed and Shaken Out.

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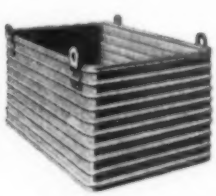

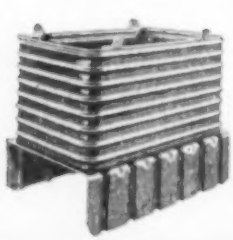

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- SIMPLICITY OF DESIGN
- RUGGED CONSTRUCTION

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Grinding wheel rotates on double bearings around a dead shaft anchored at both ends—completely eliminating all vibration and shaft whip . . . and the entire unit guaranteed for two years!

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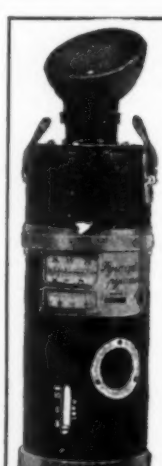

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The NEW PYRO Immersion (illustrated at the right) eliminates spoilage and insures uniform and sound non-ferrous castings. Bare Metal and Protected Type thermocouples instantly interchangeable.

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The best way to make sure of perfect metal-cleaning results and low cost of abrasives is to specify "American". Special manufacturing procedures develop the desired hardness and durability in *every pellet*—there are no slackers to break down and quit on the job. All sizes graded to new S. A. E. specifications.

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★ Dependable "Buffalo Brand" is made with a specially selected wax base to provide cores with clean, sure vents. This easy to use, low cost product has been preventing core blowings in leading foundries for over thirty-five years.

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SLOTTED TYPE ONLY

CORE BOX

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"A Specific Type for Every Core Box"

- Made of brass and diameter held to close tolerance.
- May be machined to any contour without removal from the core box or plate.
- "Shallow" or "deep" head.
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- Easily inserted.
- Easy to clean.
- Greater vent area.
- Rapid Escape of air.

Write for full information on Smillie Cleaning Tool and Smillie Inserting Drill.

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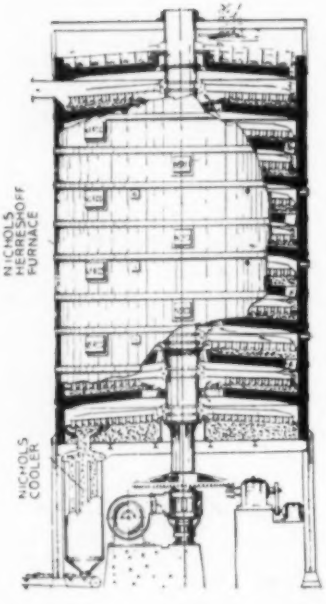

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CLEANER, STRONGER METAL STRUCTURE

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Save those PINHOLED iron castings and stop that *extravagance* now. QUALITY FLUX placed in the ladle before tapping CUPOLA purges molten metal of impurities which produce pinholes, sluggish iron and shrinkage (except limestone). Never place FLUX inside a CUPOLA to purify iron of pinhole impurities. The chemicals are destroyed before the iron fuses. *Write us today* for valuable information on FLUXES for ferrous and non-ferrous metals.

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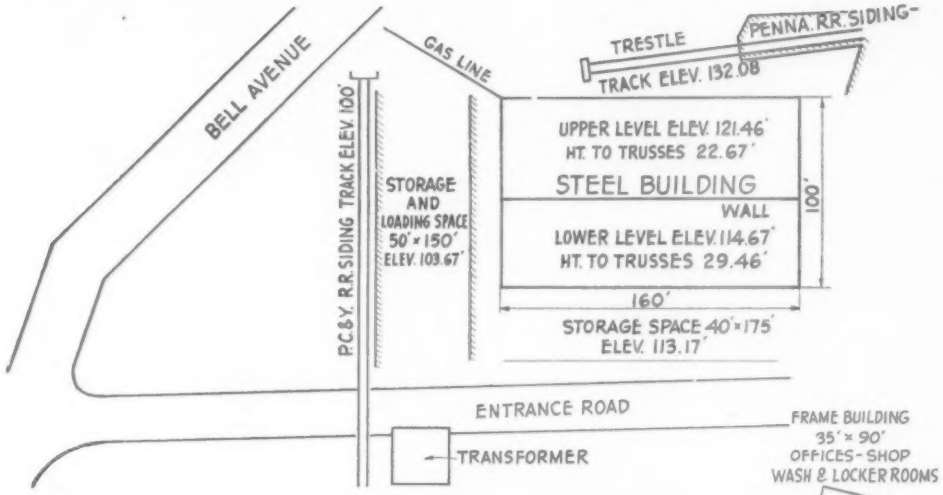

PROPERTY located in industrial area in Carnegie, Pa., 8 miles from downtown Pittsburgh. Adjacent plants are: Bethlehem Steel Co., Joseph T. Ryerson, Inc., Columbia Steel & Shafting Co., Union Electric Steel Corp., Falk & Co., Porcelain Metal Products Co. of Pittsburgh. There are two railroad sidings on the property. Slope of ground from Penna. R.R. siding for unloading, to P.C. & Y. R.R. siding for shipping makes it ideal for natural flow of materials. Ample natural gas supply available at low cost. High and low voltage power available at low cost.

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Trade Mark Steel

SHOT AND GRIT

For Toughest Blast Cleaning and Surface Peening Operations

SHOT—

- Controlled screening and grading.
- Withstands repeated strain, stress and wear in blasting equipment.
- ITS TENSILE STRENGTH AND TOUGHNESS IS ESPECIALLY ADAPTABLE FOR PEENING.
- Uniform roundness of shot. Pellets are fully utilized on impact.
- Lack of irregular shapes and hollows results in highest efficiency.
- Free from dust and other residue.
- Slowness in wearing down produces longer life and maximum usage.
- Its secret alloying and tempering process prevents rusting and reduces impact fractures.

GRIT

High-Grade Grit is thicker, sturdier, tougher. Exceptional abrasive qualities. Its construction gives longer usage. Definitely reduces operating costs.

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You are insured against failure in core support when you use this patented chaplet.

Insist on it from now on and avoid casting rejects and costly make-overs.

Cleveland Chaplets are made in Coil Head, Square Head, Stem and Double-Head types.

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CLEVELAND Since 1890 *Chaplets*

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"BRANFORD" MOLD CLEANERS

- Small, light, easily handled
- Sprayers available for any wash or powder used in the foundry
- Renewable nozzles for abrasive materials
- Snappy action
- Non-leaking valves

Literature and price-lists on request.

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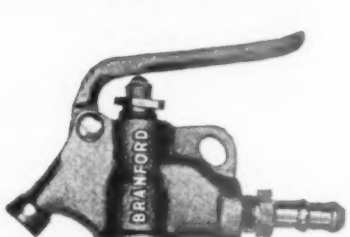

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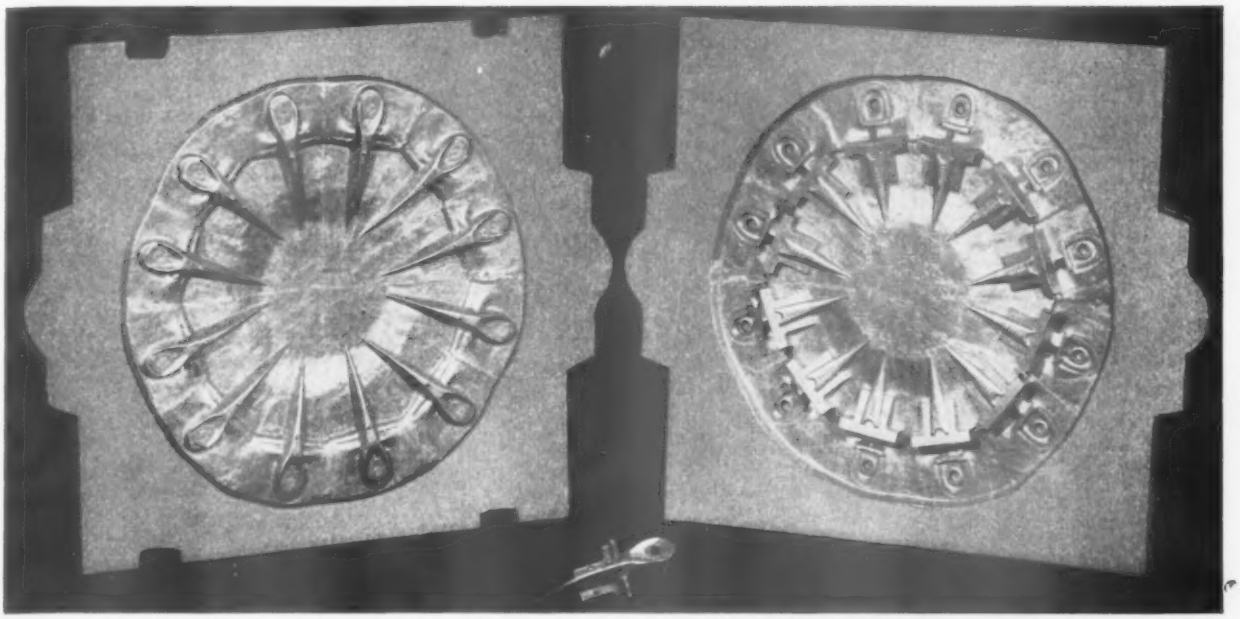

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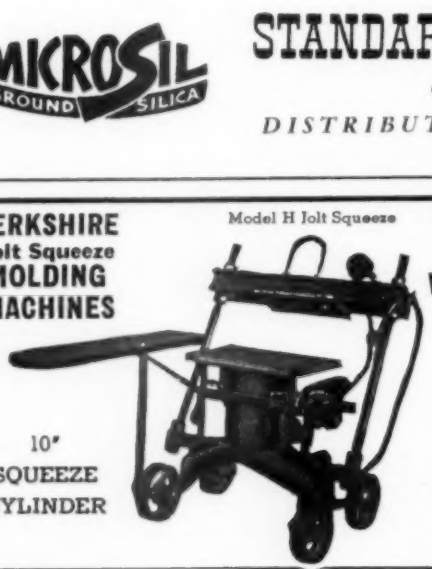

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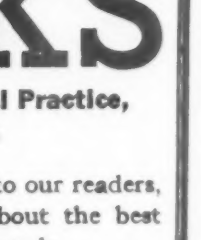

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Niagara Falls Smelting & Refining Corp., 2204 Elmwood Ave., Buffalo 17, New York.

INGOTS (Nonferrous) (cont'd)

Silverstein & Pinsof, Inc., 1720 N. Elston, Chicago 22, Ill.
Sonken-Galamba Corp., Kansas City, Kan.
U. S. Metals Refining Co., New York.
U. S. Reduction Co., E. Chicago, Ind.

INSPECTION (Cast Metals)

Magnaflux Corporation, 5910 Northwest Highway, Chicago 31, Ill.

INSPECTION (Fluorescent Penetrant)

Magnaflux Corporation, 5910 Northwest Highway, Chicago 31, Ill.

INSPECTION (Magnetic Particle)

Magnaflux Corporation, 5910 Northwest Highway, Chicago 31, Ill.

INSULATORS (for casting heads)

Houghton Co., E. F., Philadelphia, Pa.

IRON CEMENT

Smooth-On Mfg. Co., 570 Communipaw Ave., Jersey City 4, N. J.

IRON ORE

Bethlehem Steel Co., Bethlehem, Pa.
Pickands, Mather & Co., Cleveland 14, O.

IRON OXIDES

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Delta Oil Products Co., Milwaukee 9, Wis.

JACKETS (Mold)

Adams Co., Dubuque, Iowa.
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Freeman Supply Co., 1152 Broadway, Toledo 5, O.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.
Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.

LABORATORY EQUIPMENT (Chemical)

Buehler, Ltd., 228 N. LaSalle St., Chicago 1, Ill.
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
Laboratory Equipment Corp., Benton Harbor, Mich.

LABORATORY EQUIPMENT (Physical)

Buehler, Ltd., 228 N. LaSalle St., Chicago 1, Ill.
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
Laboratory Equipment Corp., Benton Harbor, Mich.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Norton Co., Worcester 6, Mass.

LADLES

Bethlehem Steel Co., Bethlehem, Pa.
Haynes Foundry Equipment Co., 1734 Lake St., Kalamazoo 21, Mich.
Industrial Equipment Co., Minster, O.
Modern Equipment Co., Port Washington, Wis.
Frederic B. Stevens, Inc., Detroit 26, Mich.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

LADLE HEATERS

Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

LADLE LININGS

Ironton Fire Brick Co., Ironton, Ohio.
Nock Firebrick Co., 1243 East 55th St., Cleveland 14, Ohio.

LATHE CENTERS

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

LEAD

American Smelting & Refining Co., 120 Broadway, New York 5.

LIMESTONE

Bethlehem Steel Co., Bethlehem, Pa.

LINSEED OIL

Hercules Powder Co., 999 Market St., Wilmington 99, Del.

LOADERS

Clearfield Machine Co., Clearfield, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

LUBRICANTS (Industrial)

Houghton Co., E. F., Philadelphia, Pa.
Swan-Finch Oil Corp., R. C. A. Bldg., West, New York 26, N. Y.
United States Graphite Co., Saginaw, Mich.

LUMBER (All kinds)

Dougherty Lumber Co., 4300 East 68th St., Cleveland 5, O.

MACHINE KEYS

Standard Horse Nail Corp., New Brighton, Pa.

MAGNESIUM (Ingots)

Apex Smelting Co., 2534 Filmore St., Chicago 12, Ill.

MAGNET CONTROLLERS

Ohio Electric Mfg. Co., 5906 Maurice Ave., Cleveland, Ohio.

MAGNETS

Dings Magnetic Separator Co., 512 E. Smith St., Milwaukee 7, Wis.
Ohio Electric Mfg. Co., 5906 Maurice Ave., Cleveland, Ohio.
Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.

MANGANESE (Briquets)

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.

MATCHPLATES

Acme Aluminum Alloys Inc., 232 N. Findlay St., Dayton 3, O.
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
City Pattern Foundry & Machine Co., 1161 Harper Ave., Detroit 11, Mich.
Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.
Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, O.
Plaster Process Castings Co., 6922 Carnegie Ave., Cleveland 3, O.
Newark Pattern and Machine Co., Newark, O.
Scientific Cast Products Corp., 1388-92 E. 40th St., Cleveland 3, O.

MECHANICAL ENGINEERS

Giffels & Vallet, Inc., Marquette Bldg., Detroit, Mich.
Wyzenbeek & Staff Inc., 550 W. Hubbard St., Chicago, Ill.

MELTING POTS

Acme Foundry Co., Detroit 16, Mich.

METAL CASTING PLASTER

United States Gypsum Co., 300 W. Adams St., Chicago, Ill.

METAL CLEANING EQUIPMENT

American Foundry Equipment Co., Mishawaka, Ind.
N. Ransohoff, Inc., 208 W. 71st St., Cincinnati 16, O.

METALLOGRAPHIC EQUIPMENT

Buehler Ltd., 228 N. LaSalle St., Chicago 1, Ill.
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.

METALLURGISTS

Associated Engineers Inc., 230 E. Berry St., Fort Wayne 2, Ind.
Chas. C. Kawin Co., 431 S. Dearborn St., Chicago 5, Ill.
W. G. Reichert Engineering Co., 1060 Broad St., Newark, N. J.

METERS (Gas, Air, Water)

Illinois Testing Laboratories, Inc., 420 N. LaSalle St., Chicago 10, Ill.
Roots-Connersville Blower Corp., Connersville, Ind.

MICROSCOPES

Buehler, Ltd., 228 N. LaSalle, Chicago 1, Ill.

MIXERS (Core Wash)

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

MIXERS (Sand and Clay)

American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Blystone Division, Standard Sand & Machine Co., 549 W. Washington St., Chicago 6, Ill.
Clearfield Machine Co., Clearfield, Pa.
Construction Machinery Co., Waterloo, Iowa.
Freeman Supply Co., 1152 Broadway Toledo 5, O.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Royer Foundry & Machine Co., Kingston, Pa.

MOLD CONVEYORS

Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Roto-Cast Foundry Equipment Inc., 100 Grand St., Coldwater, Mich.

MOLD DRYERS

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Kirk & Blum Mfg. Co., 2838 Spring Grove Ave., Cincinnati 25, O.
Liquid Carbonic Corp., 3110 S. Kedzie Ave., Chicago 23, Ill.
Porbeck Mfg. Co., 2600 N. 9th St., St. Louis, Mo.

MOLD OVENS and DRYERS

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, O.
Despatch Oven Co., Minneapolis 14, Minn.
Foundry Equipment Co., Cleveland 13, O.
Gehnrich Oven Div., W. S. Rockwell Co., 50 Church St., New York 7, N. Y.
Kirk & Blum Mfg. Co., 2838 Spring Grove Ave., Cincinnati 25, Ohio.
Lamb Company, 140 Prospect Ave., Cleveland 15, O.
Maehler, Paul. Co., 2200 W. Lake St., Chicago 12, Ill.
Porbeck Mfg. Co., 2600 N. 9th St., St. Louis, Mo.
Young Bros. Co., 6508 Mack Ave., Detroit 7, Mich.

MOLD TRUCKS (Power Operated)

Clark Tructractor Div. of Clark Equipment Co., Battle Creek, Mich.

MOLDERS' BENCHES

Western Tool & Mfg. Co., Springfield, Ohio.

MOLDING MACHINES

Adams Co., Dubuque, Iowa.
Arcade Manufacturing Div. Rockwell Mfg. Co., Freeport, Ill.
Beardsley & Piper Co., The, 2424 N. Cicero, Chicago 39, Ill.
Berkshire Mfg. Co., 1111 Power Ave., Cleveland 14, O.
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
Fellows Corp., 1012 N. Third St., Milwaukee, Wis.
Grimes Molding Machine Co., 2424 No. Cicero, Chicago 39, Ill.

MOLDING MACHINES (cont'd)

Haynes Foundry Equipment Co., 1734 Lake St., Kalamazoo 21, Mich.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
International Molding Machine Co., 2608 W. 16th St., Chicago 8, Ill.
Johnston & Jennings Co., 867 Addison Rd., Cleveland 14, O.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee 4, Wis.
Moline Iron Works, 228 Second St., Moline, Ill.
Nicholls, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Pioneer Mfg. Co., West Allis, Wis.
S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

MOLDING MACHINES (Jolt)

Adams Co., Dubuque, Iowa.
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
Grimes Molding Machine Co., 2424 No. Cicero, Chicago 39, Ill.
Haynes Foundry Equipment Co., 1734 Lake St., Kalamazoo 21, Mich.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
International Molding Machine Co., 2608 W. 16th St., Chicago 8, Ill.
Johnston & Jennings Co., 867 Addison Rd., Cleveland 14, O.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee 4, Wis.
Nicholls, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.

MOLDING MACHINES (Rollover)

Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
Grimes Molding Machine Co., 2424 No. Cicero, Chicago 39, Ill.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
International Molding Machine Co., 2608 W. 16th St., Chicago 8, Ill.
Johnston & Jennings Co., 867 Addison Rd., Cleveland 14, O.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee 4, Wis.
Nicholls, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.
Sutter Products Co., Dearborn, Mich.

MOLDING MACHINES (Squeeze)

Acme Aluminum Alloys Inc., 232 N. Findlay St., Dayton 3, O.
Adams Co., Dubuque, Iowa.
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
Haynes Foundry Equipment Co., 1734 Lake St., Kalamazoo 21, Mich.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
International Molding Machine Co., 2608 W. 16th St., Chicago 8, Ill.
Johnston & Jennings Co., 867 Addison Rd., Cleveland 14, O.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee 4, Wis.
Moline Iron Works, 228 Second St., Moline, Ill.
Nicholls, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.

MOLDING SANDS

Great Lakes Foundry Sand Co., United Artists Bldg., Detroit 26, Mich.
Ottawa Silica Co., Ottawa, Ill.
Standard Silica Corp., 209 So. LaSalle St., Chicago 4, Ill.
Wedron Silica Co., 38 So. Dearborn St., Chicago, Ill.

MOLD WASH

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
National Carbon Co., Inc., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.
United States Graphite Co., Saginaw, Mich.

MOLDS (Centrifugal, Graphite)

National Carbon Co., Inc., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.

MOLYBDENUM

Molybdenum Corporation of America, Pittsburgh 19, Pa.

MONORAIL SYSTEMS

American Monorail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Modern Equipment Co., Port Washington, Wis.

MOTOR CONTROL

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

MOTORS (Electric)

Allis-Chalmers Mfg. Co., 1128 S. 70th St., Milwaukee 1, Wis.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

NAILS (Chill)

Bethlehem Steel Co., Bethlehem, Pa.
Capewell Mfg. Co., Hartford, Conn.
Republic Steel Corp., Cleveland 4, O.
Standard Horse Nail Corp., New Brighton, Pa.

NICKEL

International Nickel Co., Inc., 67 Wall St., New York City 5.

NOZZLES (Blasting)

Alloy Metal Abrasives Co., 311 W. Huron St., Ann Arbor, Mich.
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Davenport Machine & Foundry Co., Davenport, Iowa.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Norton Co., Worcester 6, Mass.
Pangborn Corp., Hagerstown, Md.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, O.

OIL BURNERS

Fisher Furnace Co., 5535 N. Wolcott Ave., Chicago 40, Ill.
Hauck Manufacturing Co., 106 Tenth St., Brooklyn 15, N. Y.
Stroman Furnace & Engineering Co., Div. of Peterson Oven Co., 300 W. Adams St., Chicago 6, Ill.
North American Mfg. Co., 2910 E. 75th St., Cleveland 4, O.

OPTICAL PYROMETERS

Buehler, Ltd., 228 N. LaSalle St., Chicago 1, Ill.

OVENS (Annealing and Heat Treating)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Electric Furnace Co., W. Wilson St., Salem, Ohio.
Foundry Equipment Co., Cleveland 13, O.
Gehnrich Oven Div., W. S. Rockwell Co., 56 Church St., New York 7, N. Y.
Lanly Company, 750 Prospect Ave., Cleveland 15, O.
Maehler, Paul, Co., 2200 W. Lake St., Chicago 12, Ill.
Ross, J. O. Engineering Corp., 350 Madison Ave., New York 17.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.
Young Brothers Co., 6508 Mack Ave., Detroit 7, Mich.

OVENS (Core) (See CORE OVENS)

OVENS (Enameling, Japanning)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Detroit Sheet Metal Works, 1300 Oakman Blvd., Detroit, Mich.
Gehnrich Oven Div., W. S. Rockwell Co., 56 Church St., New York 7, N. Y.
Kirk & Blum Mfg. Co., 2838 Spring Grove Ave., Cincinnati 25, O.
Lanly Co., 750 Prospect Ave., Cleveland 15, Ohio.
Maehler, Paul, Co., 2200 W. Lake St., Chicago 12, Ill.
Mahon, R. C., Co., 8650 Mt. Elliott Ave., Detroit 11, Mich.
Porbeck Mfg. Co., 2600 N. 9th St., St. Louis, Mo.
Young Brothers Co., 6508 Mack Ave., Detroit 7, Mich.

OVENS (Mold)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Detroit Sheet Metal Works, 1300 Oakman Blvd., Detroit, Mich.
Gehnrich Oven Div., W. S. Rockwell Co., 56 Church St., New York 7, N. Y.
Kirk & Blum Mfg. Co., 2838 Spring Grove Ave., Cincinnati 25, O.
Lanly Co., 750 Prospect Ave., Cleveland 15, Ohio.
Porbeck Mfg. Co., 2600 N. 9th St., St. Louis, Mo.
Ross, J. O., Engineering Corp., 350 Madison Ave., New York 17, N. Y.

OXYGEN

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.

PARTING COMPOUNDS

Buckeye Products Co., 7022 Vine St., Cincinnati 16, Ohio.
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Houghton Co., E. F., 303 West Lehigh Ave., Philadelphia 33, Pa.
Midwest Foundry Supply Co., Edwardsville, Ill.
Smith Facing & Supply Co., 1857Carter Rd., Cleveland 13, O.
Frederic B. Stevens, Inc., Detroit 26, Mich.
Tamms Silica Co., 228 N. LaSalle St., Chicago 1, Ill.

PATTERN COATINGS

Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, O.
McDougall-Butler Co., 24 Evans St., Buffalo 2, N. Y.
PMS Co., 1701 Power Ave., Cleveland 14, O.

PATTERN COMPOUND

Tamms Silica Co., 228 N. LaSalle St., Chicago 1, Ill.

PATTERN LETTERS

Freeman Supply Co., Toledo 5, O.

PATTERN LUMBER

Dougherty Lumber Co., Cleveland 5, O.
Freeman Supply Co., Toledo 5, O.
Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, Ohio.

PATTERNMAKERS' PLASTER

Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, Ohio

PATTERN PLASTER

United States Gypsum Co., 300 W. Adams St., Chicago, Ill.

PATTERN PLATES

Acme Aluminum Alloys Inc., 232 N. Findlay St., Dayton 3, O.
PMS Co., 1701 Power Ave., Cleveland 14, O.

PATTERN PLATES (cont'd)

Buffalo Pattern Works, 830 Hertel Ave., Buffalo, N. Y.
City Pattern Foundry & Machine Co., 1161 Harper Ave., Detroit 11, Mich.
Freeman Supply Co., Toledo 5, O.
Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.
Plaster Process Castings Co., 6922 Carnegie Ave., Cleveland 3, O.
Scientific Cast Products Corp., 1388-92 E. 40th St., Cleveland 3, O.

PATTERN PLATE STOCK

Freeman Supply Co., 1152 Broadway, Toledo 5, O.

PATTERN SHOP EQUIPMENT

Delta Mfg. Co., 620 E. Vienna Ave., Milwaukee 1, Wis.
Freeman Supply Co., Toledo 5, O.
Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, Ohio.
Oliver Machinery Company, Grand Rapids 2, Mich.
Strand, N. A., Co., 5001 Wolcott Ave., Chicago 40, Ill.

PATTERNS (Wood, Metal)

Acme Aluminum Alloys Inc., 232 N. Findlay St., Dayton 3, O.
Buffalo Pattern Works, 830 Hertel Ave., Buffalo, N. Y.
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
City Pattern Foundry & Machine Co., 1161 Harper Ave., Detroit 11 Mich.
Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.
Howard Foundry Co., 1700 N. Kostner, Chicago 39, Ill.
Newark Pattern and Machine Co., Newark, O.
S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.

PHOTOGRAPHIC EQUIPMENT

Eastman Kodak Co., Rochester, N. Y.

PHOTOGRAPHY (Industrial)

Eastman Kodak Co., Rochester, N. Y.

PIG IRON

Bethlehem Steel Co., Bethlehem, Pa.
Brooke, E. & G., Iron Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Globe Iron Co., Jackson, O.
Hanna Furnace Co., Div. of National Steel Corp., Ecorse, Detroit 18, Mich.
Keokuk Electro Metals Co., 429 So 4th St., Keokuk, Iowa.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.
Pickands, Mather & Co., Cleveland 14, O.
Republic Steel Corporation, Cleveland 14, O.
Tonawanda Iron Corp., North Tonawanda, N. Y.
Woodward Iron Co., Woodward, Ala.

PIG IRON (Silvery)

Bethlehem Steel Co., Bethlehem, Pa
Globe Iron Co., Jackson, O.
Hanna Furnace Co., Div. of National Steel Corp., Ecorse, Detroit 18, Mich.
Jackson Iron & Steel Co., Jackson, O.
Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.

PINS (Flask)

Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.
Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

PINS (Flask) (cont'd)
Truscon Steel Co., Youngstown 1, O.

PISTON RINGS (for Molding Machines, Compressors, etc.)
Nicholls, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.

PLANT ENGINEERING SERVICE
Giffels & Vallet, Inc., Marquette Bldg., Detroit, Mich.

PLASTER OF PARIS
United States Gypsum Co., 300 W. Adams St., Chicago, Ill.

PLATES (Bottom)
Adams Co., Dubuque, Iowa.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

PLATES (Core Drying)
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Johns-Manville, 22 East 40th St., New York City 16.

PLUMBAGO
Bloomsbury Graphite Co., Bloomsbury, N. J.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Frederic B. Stevens, Inc., Detroit 26, Mich.
United States Graphite Co., Saginaw, Mich.

PNEUMATIC TOOLS
Chicago Pneumatic Tool Co., General Offices: 8 East 44th St., New York 17, N. Y.
Dallett Co., 165 West Clearfield, Philadelphia, Pa.
Dayton Pneumatic Tool Co., Dayton 1, Ohio.
Gardner-Denver Co., Gardner Drive, Quincy, Ill.
Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
Keller Tool Co., Grand Haven, Mich.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Schramm Inc., West Chester, Pa.

POLISHING MACHINERY
Strand, N. A., Co., 5001 N. Wolcott Ave., Chicago 40, Ill.

POURING DEVICES
Modern Equipment Co., Port Washington, Wis.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

POWDERED COAL EQUIPMENT
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

PRESSER BOARDS
Adams Co., Dubuque, Iowa.
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

PRESSURE CASTING SEALER
Empire Varnish Co., 2636 E. 76th St., Cleveland 4, O.

PULLEYS (Magnetic)
Dings Magnetic Separator Co., 512 E. Smith St., Milwaukee 7, Wis.
Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.

PUMPS
Construction Machinery Co., Waterloo, Iowa.
Gardner-Denver Co., Gardner Drive, Quincy, Ill.

PUMPS (Dry, Vacuum)
Fuller Company, Catasauqua, Pa.
Roots-Connersville Blower Corp., Connersville, Ind.

PURIFIERS
Cleveland Flux Co., 1026 Main St., Cleveland 13, O.

PUSH-OFF MACHINES
Champion Foundry & Machine Co., 1314 West 21st St., Chicago 8, Ill.
International Molding Machine Co., 2608 W. 16th St., Chicago 8, Ill.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee 4, Wis.

PYROMETERS
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
Illinois Testing Laboratories, Inc., 420 N. LaSalle St., Chicago 10, Ill.
Marshall Co., L. H., 270 W. Lane, Columbus 1, O.
Pyrometer Instrument Co., 106 Lafayette St., New York 13.
Tamms Silica Co., 228 N. LaSalle St., Chicago 1, Ill.

RADIOGRAPHY (Industrial)
Eastman Kodak Co., Rochester, N. Y.
Radium Chemical Co., Inc., 570 Lexington Ave., New York 22, N. Y.
Tamms Silica Co., 228 N. LaSalle St., Chicago 1, Ill.

RADIUM
Radium Chemical Co., Inc., 570 Lexington Ave., New York 22, N. Y.

RAMMERS
Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
Keller Tool Co., Grand Haven, Mich.

RAPPING PLATES
Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, O.

REFRACTORIES
Carborundum Co., Niagara Falls, N. Y.
Carborundum Co., Perth Amboy, N. J.
Cleveland Quarries Co., Guildhall Bldg., Cleveland 15, O.
Eastern Clay Products, Inc., Eifort, O.
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
Fisher Furnace Co., 5535 N. Wolcott Ave., Chicago 40, Ill.
Ironton Fire Brick Co., Ironton, O.
Johnson Fuller Co., 1366 So. Flower St., Los Angeles 15, California.
Nock Firebrick Co., 1243 East 55th St., Cleveland 14, Ohio.
Norton Co., Worcester 6, Mass.
United States Graphite Co., Saginaw, Mich.

REGULATORS (Pressure)
Liquid Carbonic Corp., 3110 S. Kedzie Ave., Chicago 23, Ill.

REPAIR PARTS (Molding Machine)
Pioneer Mfg. Co., West Allis, Wis.

RESPIRATORS
Chicago Eye Shield Co., 2300 West Warren, Chicago 12, Ill.
Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh 8, Pa.
Willson Products Inc., Reading, Pa.

RIDDLES
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis St., Philadelphia 24, Pa.

RIDDLES (Electric)
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago 14, Ill.
Great Western Mfg. Co., Leavenworth, Kans.

RIDDLES (Hand)
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

RISER RODS (Graphite)
National Carbon Co., Inc., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.

RODS (Steel)
Republic Steel Corp., Cleveland 4, O.

ROD STRAIGHTENERS
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

ROLLER-HEARTH FURNACES (Electric Annealing)
General Electric Co., Schenectady, N. Y.

RUBBER LINING MATERIAL (Abrasive Resisting)
Pangborn Corp., Hagerstown, Md.

RUST PREVENTATIVES
Houghton Co., E. F., 303 West Lehigh Ave., Philadelphia 33, Pa.

SAFETY CLOTHING
American Optical Co., Southbridge, Mass.
Chicago Eye Shield Co., 2300 West Warren, Chicago 12, Ill.
Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh 8, Pa.

SALT and SALT TABLETS
Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh 8, Pa.

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Standard Slica Corp., 209 So. LaSalle St., Chicago 4, Ill.
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Globe Steel Abrasive Co., Mansfield, Ohio.
National Metal Abrasive Co., 3560 Norton Ave., Cleveland 7, O.
Pittsburgh Crushed Steel Co., Pittsburgh 1, Pa.
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Sterling Grinding Wheel Division, Cleveland Quarries Co., Tiffin, Ohio.

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Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.

WIRE BRUSHES
Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.

WIRE NAILS
Bethlehem Steel Co., Bethlehem, Pa.
Republic Steel Corp., Cleveland 4, O.

WOOD FLOUR
Ace Foundry Materials Co., 14611 Fenkell Ave., Detroit 27, Mich.

WOODWORKING MACHINERY
Delta Mfg. Co., 620 E. Vienna Ave., Milwaukee 1, Wis.
Freeman Supply Co., 1152 Broadway, Toledo 5, O.
Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, Ohio.
Oliver Machinery Co., Grand Rapids 2, Mich.

X-RAY EQUIPMENT
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

X-RAY FILMS
Eastman Kodak Co., Rochester, N. Y.

X-RAY INSPECTION
Magnaflux Corporation, 5910 Northwest Highway, Chicago 41, Ill.

ZINC
American Smelting & Refining Co., 120 Broadway, New York 5, N. Y.

—When writing advertisers, please mention THE FOUNDRY—

Classified Advertising

Help Wanted

GRAY IRON FOUNDRY FOREMAN

Progressive production foundry in North Eastern Ohio has an excellent opportunity for foreman experienced on squeezer molding. Steady employment and splendid chance for advancement. Monthly salary and bonus. In applying state age, experience and references.

BOX 858

The FOUNDRY CLEVELAND 13, OHIO

FOUNDRY FOREMAN

Middlewest Foundry. Normal production 15 to 20 tons daily. Must be able to handle men and direct operation of cupola. Work consists of small castings on squeeze machines and other machine work, together with floor molding. Castings usually running up to three or four hundred pounds and occasionally die blocks weighing one to two tons. Applicants please state salary desired and when available. Address: Box 809, The FOUNDRY, Cleveland 13, Ohio.

METALLURGIST

Must be experienced in Gray Iron Foundry practice, specializing in automotive castings. Located in Western Michigan. Must be able to take COMPLETE charge of cupolas.

BOX 863

THE FOUNDRY CLEVELAND 13, OHIO

MOULDERS WANTED

On Tablet and Ornamental Bronzes. State age, last places worked and when you can start work. Eight hour day, forty hour week. Steady job. Address Box 816, The FOUNDRY, Cleveland 13, Ohio.

ALUMINUM OPEN HEARTH OPERATOR

Secondary nonferrous refiners. Midwestern Region. State experience, qualifications, references and wages desired in first letter. Address: Box 867, The FOUNDRY, Cleveland 13, Ohio.

STEEL FOUNDRY FOREMAN

West Coast foundry desires an experienced and aggressive foundryman to supervise all phases of molding. Acid electric shop. Must be familiar with production control and scheduling. Address: Box 872, The FOUNDRY, Cleveland 13, Ohio.

BRASS OPEN HEARTH OPERATOR

Secondary nonferrous refiners. Midwestern Region. State experience, qualifications, references and wages desired in first letter. Address: Box 866, The FOUNDRY, Cleveland 13, Ohio.

BRASS FOUNDRY FOREMAN

A working foreman to assist Foundry Superintendent in a well equipped production brass foundry; good opportunity for a hustler. State age, experience and salary desired in first letter. Address: Box 192, The FOUNDRY, Cleveland 13, Ohio.

Help Wanted

IRON FOUNDRY SUPERINTENDENT

Practical foundryman with ability to read blueprints, to estimate molding time, to produce in accordance with estimates and to handle employees. Prefer man 40 to 50 years of age. Permanent position if services are satisfactory. Salary commensurable with results obtained. Plant has a record of 100 years successful operation in the production of large castings. Floor and pit molding. Address: Box 875, The FOUNDRY, Cleveland 13, Ohio.

METALLURGIST
OR
PRACTICAL SUPERINTENDENT

To take full charge of brass and bronze ingot smelting department in Eastern Pennsylvania. Permanent position. When replying give past experience, references and salary expected. Address: Box 878, The FOUNDRY, Cleveland 13, Ohio.

PATTERN MAKER

Experienced on master patterns, core boxes for production brass foundry producing small castings. Good working conditions, small town, year around job. Give full information about yourself in first letter. Address: Box 805, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY EXECUTIVE

One thoroughly experienced in foundry operation who could assume executive responsibility in an old established firm. Possible to acquire part equity, if desired, in the business. In replying state age, experience, references and other details. Location—Central West. Address: Box 871, The FOUNDRY, Cleveland 13, Ohio.

LABOR FOREMAN

In steel foundry in the New York Metropolitan area. Experienced man to take charge of pouring and shakeout crew. Address: Box 911, The FOUNDRY, Cleveland 13, Ohio.

LABORATORY AND SALES

Young man with good personality having foundry or technical experience to run tests on clay and sand samples with view of transfer to sales department when qualified by experience. Give full information as to education, experience, age, salary required, etc. Address: Box 894, The FOUNDRY, Cleveland 13, Ohio.

PLANT MANAGER

For medium size cast iron plumbing fixture plant. Give full particulars including salary. Address: Box 751, The FOUNDRY, Cleveland 13, Ohio.

MELTER

TECHNICALLY TRAINED MAN CAPABLE OF TAKING CHARGE OF ELECTRIC MELTING DEPARTMENT. MUST HAVE HAD EXPERIENCE ON HIGH ALLOY AND CARBON STEEL. ADDRESS: BOX 876, THE FOUNDRY, CLEVELAND 13, OHIO.

CORE ROOM FOREMAN

Must have knowledge of bench, rollover and core blower machines. Must have experience in production of gray iron foundry products. State age, education, experience in detail and salary requirements. Address: Box 906, The FOUNDRY, Cleveland 13, Ohio.

WANTED
SALESMEN or MANUFACTURERS' AGENTS

Now calling on foundries and forgings companies to handle complete line of Missouri refractories. Write in detail giving territories now covered, products handled, qualifications, etc. Address: Sales Manager, Chicago Fire Brick Company, 1467 Elston Ave., Chicago 22, Ill.

FOUNDRY SUPERINTENDENT

Well established jobbing foundry in Michigan community desires services of competent and aggressive foundry superintendent. Foundry has handled jobbing work during its forty-year history but is now branching into semi-production work. Man must be able to take full charge of foundry, core room and cupola in foundry that now employs ten molders. Will pay good salary plus attractive bonus plan for qualified man looking for a future. Give age, record of experience and salary desired in first letter. Address: Box 838, The FOUNDRY, Cleveland 13, Ohio.

Help Wanted

FOUNDRY FOREMAN

Northern Ohio gray iron foundry. Experienced in production sand slinger and rollover work. Excellent opportunity for right man. Monthly salary and bonus. State age, experience and references.

BOX 864

The FOUNDRY CLEVELAND 13, OHIO

EXECUTIVE ENGINEER WITH MECHANICAL EXPERIENCE

Must have broad general plant supervisory experience and thorough knowledge of tool room and general machine shop practice, with some knowledge of general foundry practice.
Must have proven executive capacity and capable of directing labor relations.
Plant located at Cleveland, Ohio. 1000 employees engaged in the manufacture of pipe fittings.

BOX 889

THE FOUNDRY CLEVELAND 13, OHIO

ASSISTANT FOUNDRY SUPERINTENDENT

For aluminum foundry located in the New England area. Must be experienced in handling men. Give full qualifications and past experience.

BOX 908

The FOUNDRY CLEVELAND 13, OHIO

FOUNDRY SUPERINTENDENT

Thoroughly experienced man to head up Indiana gray iron squeezer production foundry. Latest equipment. Must know work from sand up and be a good trainer of men. Preferably under 55 years of age. Write full details and salary expected. Address: E. F. GALVIN, 20 N. WACKER DRIVE, CHICAGO 6, ILL.

SUPERINTENDENT

Young, for long established grey iron and semi-steel captive foundry. 30 ton daily. Strong on cupola, sand, gating and risering and know how to handle men. South Central Pennsylvania. Address: Box 879, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN

Nonferrous. Technical graduate with five to ten years of foundry experience. Age 30 to 40. New York City. Good salary with excellent future. Write stating experience and salary desired. Address: Box 870, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

SUPERINTENDENT-MANAGER

Practical high grade gray iron foundryman, technically trained with 28 years' broad experience from molder to superintendent producing quality castings in both conventional and highly mechanized foundries in machine tool, general machinery, diesel motors and high production. Well versed in both green and dry sand, continuous pouring, core blowers, sand control, rigging, molding machines and working from blueprints. Wants to make connection with good reliable foundry that needs the services of a high grade foundryman that will produce results. Eastern territory preferred. Address: Box 877, The FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT

Practical, technically trained foundryman in all departments of gray iron foundry work. Has wide background of experience and knowledge in mechanized equipment, control, rigging, production and costs. Want connection running foundry where knowledge and experience will be of value. Age 48, location East. Address: Box 888, The FOUNDRY, Cleveland 13, Ohio.

Classified Advertising

Positions Wanted

FOUNDRY SUPERINTENDENT OR GENERAL FOREMAN

45 years of age, 28 years' practical experience in the foundry from molder, coremaker to superintendent in general jobbing, machine and production. Good rigger on patterns, flasks and mechanized equipment. Want to make connection with a reliable company that needs a foundryman of my experience. Am available at once. Address: Box 891, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY EXECUTIVE

Technical education with 20 years' experience as Manager and Superintendent in modern high production, jobbing and development foundries. Primarily interested in grey iron but also have unusual nonferrous experience. Capable of handling all foundry departments and machine shop. Successful in handling an organization of several hundred employees. Location is not important. Address: Box 901, The FOUNDRY, Cleveland 13, Ohio.

PRACTICAL FOUNDRYMAN

With 25 years of steel foundry experience as molder, cleaning room foreman, foundry foreman, assistant superintendent and superintendent in steel and alloy steel. Well versed in all phases of production. Available on short notice. Address: Box 905, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY ENGINEER

Diversified experience in gray iron and steel. Outstanding record of accomplishment trouble shooting on production. Skilled in foundry layout, plant design and mechanization. Well versed on scientific melting and mixing. Address: Box 571, The FOUNDRY, Cleveland 13, Ohio.

PATTERNMAKER

Capable of taking over shop, estimate cost and layout work to produce accurate sound castings. General pattern shop experience both wood and metal patterns and driers and core blowing. Ability to handle men and train apprentice. First class mechanic and can qualify as working foreman in small shop or supervise large shop. Address: Box 779, The FOUNDRY, Cleveland 13, Ohio.

GRAY IRON FOUNDRYMAN

Wants to make new connection. Practical experience with technical training and cost minded. Experienced with work ranging from a few pounds to ten ton. Good rigger for production. Understand gray iron metallurgy. Mix iron by analysis. A1 cupola supervision. Capable of handling a foundry organization as top management, assistant to a busy executive or as a foundry superintendent. Middle age. Good personality. Address Box 834, The FOUNDRY, Cleveland 13, Ohio.

NONFERROUS FOUNDRYMAN

OF WIDE EXPERIENCE AND SUCCESSFUL RECORD IS OPEN FOR ENGAGEMENT IN MEDIUM SIZED FOUNDRY IN CHICAGO AREA. UNEXCELLED AS TROUBLE SHOOTER. ADDRESS: BOX 851, The FOUNDRY, CLEVELAND 13, OHIO.

FOUNDRY MANAGER

Foundryman with considerable experience in making light castings both malleable and grey iron wants position as foundry manager. Address Box No. 811, The FOUNDRY, Cleveland 13, Ohio.

CONSULTANT

Steel melting and allied control and testing problems. Twenty years' practical operating and control experience covering all grades acid and basic electric highly successful practice. Installing proven methods. Highest references. Address: Box 909, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

28 years as foundryman. 15 years as foreman and assistant. Address: Box 882, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

GENERAL MANAGER

Mature, profit-minded, dependable. Has successfully managed four companies—two taken out of the red. Available for service shortly with medium-size company requiring reliable directing ability in management, sales, finance and production. Excellent experience machinery, tool, foundry and related lines. Address: Box 445, The FOUNDRY, Cleveland 13, Ohio.

NONFERROUS SALES MANAGER OR PLANT EXECUTIVE

Eight years' nonferrous experience sales and manufacturing. Fifteen years' industrial experience. 37 years old, married, honest, dependable, excellent references. Address: Box 784, The FOUNDRY, Cleveland 13, Ohio.

STEEL MOLDING SUPERVISOR

Four years' supervisory experience in the most modern and complete foundry in the United States Navy. Eleven years' molding experience in synthetic sands, brass, iron and steel. Would like to start with a small or new steel foundry with chance of advancement. East coast preferred. Age 35, married. Address: Box 829, The FOUNDRY, Cleveland 13, Ohio.

BRASS FOUNDRY FOREMAN

Practical experience on high grade work including chandelier castings, grave markers, ornamental bronze, hardware, steam valves, jobbing and production work. Prefer position with manufacturing plant. Address: Box 472, The FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT—MANAGER

Age 43 Metallurgist. Wide experience specialty steel. Rolled and cast products. Heavy on centrifugally cast tubing. Expert on electric arc melting. Address: Box 842, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Practical iron foundryman. Technically trained. Has broad working knowledge of all foundry activities in production and jobbing foundries. Experienced in mold conveying, sand preparation and distribution. Had charge of foundries producing up to 125 tons daily. Good record handling union labor. East or Middle West preferred. Address: Box 846, The FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT, GENERAL FOREMAN

For grey iron jobbing shop. Practical man on light, medium and heavy work with core room and good cupola practice. Employed, 25 years' executive experience. Address: Box 845, The FOUNDRY, Cleveland 13, Ohio.

METALLURGICAL ENGINEER

Grad. B.S. Mich. Tech. '41., Age 28, single; 1 yr. experience trouble shooting and investigations in large forge plant, 3½ yrs. Corps of Engr. U. S. Army. Past year now employed as shift foreman in nonferrous smelter and refiner. Desires responsible position with opportunity for advancement. Travel anywhere. Address: Box 899, The FOUNDRY, Cleveland 13, Ohio.

EXECUTIVE—STEEL

ENERGETIC AND PROGRESSIVE FOUNDRYMAN, AGE 35, DESIRES POSITION WITH RELIABLE AND ESTABLISHED STEEL FOUNDRY IN THE CAPACITY OF WORKS MANAGER OR GENERAL SUPERINTENDENT. PREVIOUS EXPERIENCE ENTAILS SUPERINTENDENCY OF SEVERAL FOUNDRIES. PRESENTLY EMPLOYED IN EXECUTIVE POSITION. THOROUGHLY FAMILIAR WITH OPEN-HEARTH, ELECTRIC AND TRIPLEX MELTING METHODS. PRACTICALLY AND TECHNICALLY TRAINED. WILL CONSIDER SUITABLE POSITION IN ANY LOCALITY. NO OBJECTIONS TO CONSULTANT POSITION. EXCELLENT REFERENCES. ADDRESS: BOX 900, THE FOUNDRY, CLEVELAND 13, OHIO.

Positions Wanted

COREROOM SUPERINTENDENT OR FOREMAN

18 YEARS' EXPERIENCE IN COREROOM AS FOREMAN AND SUPERINTENDENT. PRO- [illegible] AND ROLLOVER MACHINE IN GREY IRON AND STEEL. HAVE TRAINED NEW EMPLOYEES—BOTH MEN AND WOMEN. WILL GO ANYWHERE. ADDRESS; BOX 886, THE FOUNDRY, CLEVELAND 13, OHIO.

ASSISTANT SUPERINTENDENT FOUNDRY METALLURGIST

B.S. Metallurgical Engineering—6 years' experience as Foundry Metallurgist in charge of control and production in brass, bronze, aluminum, steel, gray iron and malleable foundries. Want permanent position with established, reliable company. Address: Box 883, The FOUNDRY, Cleveland 13, Ohio.

AVAILABLE

Foundry and industrial engineer, for modernization, mechanization, surveys, wage incentives, production controls, cost control in grey iron, malleable and steel, on consulting or [illegible] contract basis. Address: Box 813, The FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT

Foundryman with 20 years' experience in all phases of gray iron work in floor and mechanized foundries. Forty-three years of age, married. Address: Box 868, The FOUNDRY, Cleveland 13, Ohio.

SALESMAN
Foundry supplies or foundry machinery

Twenty years' experience in the foundry industry, both practical and technical knowledge. Excellent contact ability. Will travel any section of country. Salary and commission. Address: Box 865, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY EXECUTIVE

Foundryman with 32 years of gray iron automotive castings production experience. Practical experience in all phases of foundry operations. Last eighteen years as superintendent and manager. Available with short notice. Address: Box 874, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Forty-one years of age with twenty years' experience in grey iron jobbing business. Thoroughly grounded in all phases of foundry practice. Prefer medium casting production, either on rollover or squeezer machines. Address Box 892, The FOUNDRY, Cleveland 13, Ohio.

ABRASIVE EXECUTIVE AND SALESMAN

Under 40 with 16 years' experience in plant and field desires position with progressive grinding wheel manufacturer. Location secondary to position and salary. Address: Box 880, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Foundryman, practical and technical training, open hearth, electric and cupola. Wide knowledge metallurgy, sand control, sales and estimating. Age 37. Address: Box 887, The FOUNDRY, Cleveland 13, Ohio.

STAINLESS AND ALLOY CAST STEEL

ASSISTANT MANAGER AND PROCESS ENGINEER AVAILABLE SOON, EXPERT ON GATING AND RISERING. 22 YEARS OF FOUNDRY EXPERIENCE. EXPERIENCED IN ALL PHASES OF THE MANUFACTURE OF STEEL CASTINGS, WELL VERSED IN FOUNDRY COSTS, CAN INCREASE YOUR YIELD, REDUCE YOUR SCRAP AND IN GENERAL INCREASE YOUR EFFICIENCY AND PROMOTE. PREFER MIDWEST LOCATION. ADDRESS: BOX 897, THE FOUNDRY, CLEVELAND 13, OHIO.

MECHANICAL DRAFTING

Mechanical drafting, tracings, prints, charts, etc. Send sketch for quotation.

DIXIE DRAFTING & DESIGN CO.
DRAWER 748
DOUCETTE, TEXAS

Classified Advertising

Positions Wanted

CUPOLA FOREMAN

Available at once. Prefer large foundry operating several cupolas. Many years' experience and can take complete charge of melting operations. Address: Box 857, The FOUNDRY, Cleveland 13, Ohio.

METALLURGIST

Experienced in technical aspects of foundry practice wishes to make token investment in small foundry and to become associated with same in managerial capacity. Honest, aggressive, pleasant personality, age 34. Address: Box 910, The FOUNDRY, Cleveland 13, Ohio.

NONFERROUS METALLURGIST

B. S. in metallurgical engineering. Three years' experience in foundry research, principally copper-base alloys. Desire position in development or production capacity. Middle West preferred. Address: Box 904, The FOUNDRY, Cleveland 13, Ohio.

AVAILABLE

Foundryman who can get the kinks out of your foundry, coreroom, cupola pattern shop or organization. An experienced superintendent in either a jobbing or production shop. Skilled in the metallurgy of chilled iron, high strength and alloyed iron. Will consider working on a short term contract or consulting basis. Address: Box 907, The FOUNDRY, Cleveland 13, Ohio.

INDUSTRIAL RELATIONS MANAGER

Specializing in labor relations, writing and negotiating contracts, handling grievance and arbitration cases, wage stabilization, price relief, job evaluation, merit rating, employment, foremanship training, social and welfare programs. Experience iron and steel foundries, machine shops, 10 years in labor unions as international representative, six years in management, good education, age 39, excellent references. Starting salary $8400. Address: Box 912, The FOUNDRY, Cleveland 13, Ohio.

NOW AVAILABLE

Director or Assistant Director of industrial relations. Nine years experience as Director in foundry and steel plant. Mid-West location preferred. References. Address Box 831, The FOUNDRY, Cleveland 13, Ohio.

Open Capacity

OPEN CAPACITY

Jobbing foundry has open capacity for sand cast, light to medium weight aluminum castings.

C. I. LEE & SONS
Aluminum Foundry
527 Nebraska St., Farley, Iowa.

OPEN CAPACITY

Have open capacity for grey iron foundry work. Weight range 20 to 1000 pounds. Address: Box 898, The FOUNDRY, Cleveland 13, Ohio.

CAPACITY AVAILABLE

Permanent and semi-permanent molding. We have capacity open for large and small aluminum castings.

QUEENCO INC. 3426 SPRING GROVE AVE.
CINCINNATI, OHIO

OPEN CAPACITY

In Central Wisconsin gray iron foundry. Either bench or floor work castings up to one hundred pounds. Long term contract preferred. Though all inquiries will be promptly considered. Address: NESHKORO FOUNDRY, NESHKORO, WISCONSIN

ALUMINUM PERMOLD CASTINGS

Production quantities in all alloys. Send prints or samples for quotation. Can make own molds if not too intricate. Fast deliveries. Well equipped all electric foundry and machine shop East Coast. Address: Box 869, The FOUNDRY, Cleveland 13, Ohio.

Capacity Wanted

WANTED

Foundry to make small gray iron castings. Can give contract for 350 to 500 ton first year. Pattern plates furnished. Address: C. G. S., P. O. Box 31, Oconto, Wis.

CAPACITY WANTED

Foundry has open capacity for matchplate production work. Eight jolt squeeze machines. Core work. Address: Fenton & Hagan Foundry, Ridgeland, Miss.

NEED URGENTLY
GRAY IRON FOUNDRY CAPACITY
FOR CERTIFIED SCHEDULE "A" ORDERS

Can give yearly contract for all or part of 100 tons monthly of cast iron boiler parts (some cored) weighing 20-95 pounds. Require rollover and pattern draw machines of 600 pound capacity. Plated production patterns and core equipment available. Foundries in Ohio, Pennsylvania or West Virginia preferred.

BOX 861
THE FOUNDRY CLEVELAND 13, OHIO

Foundries For Sale

FOR SALE

GRAY IRON FOUNDRY. Equipped to produce castings up to 4000 lbs. Steady customers. Extra land for expansion. Excellent opportunity to purchase small foundry.

FOUNDRY AND MACHINE SHOP. Steady business and opportunity to expand operations. Located in small town.

EDWARD H. ZOLL
Industrial Properties Throughout the East
790 Broad St. Newark 2, N. J.

Phone MArket 3-4539

FOR SALE

Small foundry and machine shop. 6500 square feet floor space with over two acres land. Foundry equipped to pour gray iron, aluminum and brass. Located in Central Virginia.

BURGESS & LEE FOUNDRY & MACHINE CO.
BOX 170
CULPEPER, VIRGINIA

FOR SALE

Non-ferrous foundry and pattern shop in Indiana. Plant and equipment practically new and expansion still in process. Capacity sold and refusing orders. Doing $500,000 annual business and earnings show unusually high return after taxes. C.P.A. and appraisal reports available. Clean, modern shop, well stocked with scarce materials. Owner selling because of bad health and desires retirement.

MYRON R. GREEN
705 ELECTRIC BUILDING
INDIANAPOLIS 4, INDIANA

FOR SALE

Gray iron foundry in Indiana for small and medium castings. Site about 5 A on private 10-car switch. App. 80,000 sq. ft. of buildings. Fully equipped with 10-ton capacity per hr. Estimated values: equipment, $180,000; buildings, $115,000; inventory, $20,000; site, $10,000; switch, $10,000; surplus equipment, $20,000. Excellent labor conditions and low operating costs. Price $300,000.

MYRON R. GREEN
705 ELECTRIC BUILDING
INDIANAPOLIS 4, INDIANA

FOR SALE

Iron and steel foundry and pattern shop. Two Iron cupolas with combined capacity of twelve tons an hour. One electric steel furnace five hundred pounds an hour. Large quantity of work, no labor troubles. Owner getting old and wants to retire. Established twenty eight years ago. Address: DOWLING FOUNDRY COMPANY, SAVANNAH, GA.

Foundries For Sale

FOR SALE

Small foundry in Middle West, equipped for the making of brass, malleable or grey iron. Address: Box 852, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Small grey iron and aluminum foundry. Location Northern Ohio. Fully equipped. Priced to sell. Immediate possession. Address: Box 884, The FOUNDRY, Cleveland 13, Ohio.

Correspondence Course

THE CUPOLA IS THE HEART OF THE FOUNDRY

Turn the searchlight of McLain's System on your cupola. 90c of every dollar is spent before melting begins—but some make it look like 30c by indifferent melting. Are you using the maximum percentage of steel scrap in your castings? If not, why not? The value of the scrap pile lies in the fact it offers you food for thought. Our system is worth the fee as a desk reference. Synopsis free.

McLAIN'S SYSTEM INC.
236 E. NORTH AVE., MILWAUKEE 12, WIS.

Wanted-To-Buy

WANTED

Small grey iron foundry to rent or lease with option to buy in State of Wisconsin. Address: Box 787, The FOUNDRY, Cleveland 13, Ohio.

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price for immediate acceptance. Address Box 578, The FOUNDRY, Cleveland 13, Ohio.

WANTED

500 to 2000 pounds electric melting steel furnace. State size transformer capacity, primary voltage and price. Address: Box 856, The FOUNDRY, Cleveland 13, Ohio.

WANTED

2—No. 710 or No. 712 Osborn Jolt Squeeze stripper molding machine or will trade on equitable basis, 1—No. 602 Osborn jolt rollover pattern draw molding machine, purchased in 1943 and little used. Address: Box 890, The FOUNDRY, Cleveland 13, Ohio.

WANTED

No. 7 or No. 8 Whiting cupola or approximately same size of another make. Address: FURNACE FOUNDRY COMPANY, JACKSON, OHIO.

MACHINERY WANTED

36" x 48" or 48" x 48" foundry bumper. State make, age, location and price.

BOVAIRD & SEYFANG MFG. CO.
BRADFORD, PA.

WANTED

No. 3 "Beardsley & Piper" Speedmuller.

GREDE FOUNDRIES, INC.
P. O. BOX 443
MILWAUKEE 1, WIS.
TELEPHONE: MITCHELL 2450

Classified Advertising

Wanted-To-Buy

WANTED

27" x 36" American wheelabrator. Prefer complete with motors and loading skip. Advise price, age and location. Address: Box 902, The FOUNDRY, Cleveland 13, Ohio.

WANTED

4—36 cu. ft. capacity straight-side turnover buckets similar to Steubner Style #108—Wire price and condition.

HUNT-SPILLER MFG. COR.
383 DORCHESTER AVE.
SOUTH BOSTON, MASS.

WANTED

One American Wheelebrator Tumblast, 27 inches by 36 inches. Complete in A-1 condition. Address: Box 860, The FOUNDRY, Cleveland 13,

WANTED

1 American Wheelabrator, size 27 x 36 with loading device. Immediate delivery. Address: 862, The FOUNDRY, Cleveland 13, Ohio.

WANTED
STEEL FLASKS

What have you? Condition, particulars and price. Address: St. Jerome Industries Ltd., Castonguay St. West, St. Jerome, Prov. Quebec, Canada.

Employment Service

SALARIED POSITIONS
$2,500-$25,000

This thoroughly organized confidential service of 36 years' recognized standing and reputation carries on preliminary negotiations for supervisory, technical and executive positions of the calibre indicated. Retaining fee protected by refund provision. Identity covered and present position protected. Send only name and address for details.

R. W. BIXBY, INC.
101 Dun Bldg. Buffalo 2, N. Y.

Opportunities

OWNER WILL SELL
CHOICE VACANT-ZONED MFG.
FIVE ACRES ON SOUTHWEST SIDE
IN CHICAGO, ILL. ON BELT R. R.

Paved streets and improvements to property; good labor market. Ideal location for warehouse or plant. Priced to sell. Will build and finance.

BOX 893

THE FOUNDRY CLEVELAND 13, OHIO

OPPORTUNITIES

Aluminum permanent mold castings and permanent molds. Prompt deliveries. Territories available for commission sales agents.

AMERICAN IMPEX CORP.
METUCHEN, N. J.

Opportunities

OPPORTUNITY

We can furnish empty tight and slack wooden barrels also steel drums for your products. ADDRESS: BUCKEYE COOPERAGE STATION, C.P.O. BOX 1501, CLEVELAND, OHIO.

WANTED

Foundry to make grey iron castings. Patterns mounted for roll-over equipment, six patterns in all. Will need approximately 40 tons per month Castings must be machinable, average weight—100 lbs.

THE PECK, STOW & WILCOX CO.
SOUTHINGTON, CONN.

For Sale

FOR SALE

SPECIAL: (1)—Pangborn Roteblast #28, type GK, Barrel 64" long x 36" diam. complete with scoop type loading device and abrasive reclaimer, following 220/440-V.3-PH.60-CY. motors & controls. (2)-15-HP., (2)-7½-HP. & (2)-2-HP. This equipment PRACTICALLY NEW OF LATEST DESIGN STILL ERECTED AVAILABLE FOR IMMEDIATE INSPECTION & SHIPMENT. WE SUGGEST YOU WIRE OR PHONE FOR OPTION TO COVER INSPECTION.
(1)—5'x8" SIMPLICITY SHAKEOUT WITH 20-HP., 220/440-VAC MOTOR & CONTROL.
(2)—PRACTICALLY NEW WHITING BOTTOM POUR LADLES, 17-TON CAPACITY, IN STEEL EACH WITH TRUNIONS ON SQUARE BAIL FOR BOTH LADLES.

OVERHEAD ELECTRIC TRAVELING CRANES

	TONS	MAKE	SPAN	CURRENT
(1)	10/5	Northern	45'0"	220-VAC.
(1)	10	Chesapeake	59'0"	230-VDC.
(1)	10	Northern	60'0"	440-VAC.
(1)	10	Champion	86'0"	440-VAC.
(1)	15	Shaw	106'8"	230-VDC.

(1)—Chesapeake 5-ton, 3-motor, FL. OR CG. OP., Gantry Crane, 220/440-VAC., 19'11" BET. LEGS, 5'6" overhang each end.
(1)—200-KW., 250-VDC., Allis Chalmers M.G. Set, 285-HP., SYN. MOTOR, 440/3/60-CY., with A.C. & D.C. panels & Starting Equipment.

SEND FOR OUR STOCK LIST OF A.C. & D.C. MOTORS, GENERAL PURPOSE CRANE & MILL TYPE.
WE OFFER ONLY EQUIPMENT WE OWN AND CAN MAKE PROMPT SHIPMENT.

T. B. MacCABE CO.
4304 CLARISSA ST.
PHILADELPHIA 40, PA.

FOR SALE

1—Pittsburgh electric motor driven brinnell hardness testing machine.

2—Leeds & Northrup square type micromax recording heat control regulators. (Above equipment used very little and in excellent condition. Any reasonable offer will be accepted. Inquiries most welcomed.)

Write, wire or call—

A. JEROME LEONARD, MANAGER
MAJOR AIRCRAFT FOUNDRY
PUENTE, CALIFORNIA
TELEPHONE—PUENTE 558-42

For Sale

We have the following surplus available for sale:
MOTORS AND PUMPS
4—Spencer PS-25 Class L Thermo-Exhausters with 3 HP Westinghouse motors attached 440 V, 1800 RPM, AC, 3 PH.
8—Spencer M1H Class H Thermo-Exhausters with 30 HP Westinghouse motors attached 440 V, 3 PH., AC.
12—Fairbanks, Morse Pumps with 25 HP Fairbanks, Morse motors attached 440 V, 3 PH., AC.
4—Vickers V134 LH Pumps with Westinghouse 20 HP motors attached 440 V, AC, 3 PH.
VALVES
104—Oil Gauges
120—Butterfly Air Valves
80—240-02 Sensitrol Oil Valves
8—Automatic Switch Co. ⅜ x ⅜ type PNVA.
4—Leeds and Northup Valve Motors.
16—Hydraulic, 4-way, double solenoid operating valves.
8—Logansport ¾" and 1¼" valves.
20—W. S. Rockwell—Blast Gates 2", 6", 5" and 8".
8—Connelly "H" valves 2½" x 2".
4—No. 11 Regulators 3".
8—North American Air Valves 6".
48—Marshalltown 2½" diaphragm Gates.
BURNERS
92—North American Oil Burner No. 210.
8—North American Dual Fuel Burners No. 220.
52—North American Oil-Air Ratiotrols.
8—Wheel Co. Flame Eyes.
This is offered subject to prior sale.

CONDENSER SERVICE & ENGINEERING CO., INC.
95 RIVER ST.
HOBOKEN, N. J.

MOLDING MACHINES
1—12" x 16"—8" Draw Type T.J. International Jar Ramming Power Stripping Molding Machine, Serial No. 16937.
1—20" x 26"—8" Draw Type J.W.P. International Jar Ramming Power Stripping Molding Machine Serial No. 16123.
1—#45 P Osborn Little Wonder Hand Roll-Over Molding Machine Serial No. 5579-F.
1—#46 P Osborn Little Wonder Hand Roll-Over Molding Machine, Serial No. .....
3—#151 P Osborn Drop Plate Molding Machines, Serial Nos. 5578-A, 5578-B, and 5933-D.
1—#152 Osborn Drop Plate Molding Machine Serial No. 6841-B.
1—14" x 22"—8" Draw Type G International Jar Ramming Power, Hand Strip Molding Machine, Serial No. 9345.

CAST IRON FLASKS
192 sets 13" x 25"—7" Cope, 3" Drag
102 sets 20" x 20"—8" Cope, 3" Drag
60 sets 22" x 22"—9" Cope, 3" Drag
80 sets 20" Round—7" Cope, 3" Drag
100 sets 22" Round—7" Cope, 4" Drag

STEEL FLASKS
80 sets 17" x 18"—10" Cope, 7" Drag

CAST IRON BOTTOM PLATES
100—14" x 25" 60—20" Round 65—23" x23"
120—21" x 21" 75—22" Round

HARDWOOD TAPERED SNAP FLASKS
Miscellaneous lot, consisting of 225 various sizes, ranging from 8½" to 19" wide, 14" to 41" long. Write for complete list of sizes.
All sales cash with order, F.O.B. Sandusky, Ohio, equipment subject to inspection at our plant.

THE G. & C. FOUNDRY CO.
SANDUSKY, OHIO

DRYING OVEN
FOR SALE

Swartout 2-compartment portable electric manufactured by Foundry Equipment Co.—complete with ¼ HP motor and blower rated 15-20 kilowatts—operates on 220—3 phase—60 cycles—size O.A. 78" W x 54" D x 74" H—Good condition—Cost $1005.00 selling price $500.00.

BOX 881

THE FOUNDRY CLEVELAND 13, OHIO

Classified Advertising

For Sale

USED

Precision Casting

FOUNDRY EQUIPMENT

For Sale

Immediately Available

1—#3403 Stewart gas fired pusher furnace; temperature 1800° F.; Tunnel—12 inches high, 13¾ inches wide and 144 inches long; complete with automatic controls. Original cost $5,685.00; Two years intermittent use only.

1—B20 Vapor blast. Original cost $1,250.00; practically new condition.

1—Detroit Rocking Arc furnace with extra shell, patterns etc., for making pressure castings. Original cost over $1,800.00. Excellent condition.

•Miscellaneous other items used in precision casting manufacturing also available.

Contact: Roger Froemming, Clever-Brooks Company, 5100 North 33rd Street, Milwaukee, Wisconsin.

CENTRIFUGAL COMPRESSORS AND BLOWERS

5000 cfm @2# Spencer CC with 75 HP 3/60/1750 RPM motor.
1250 cfm @1# Buffalo 7x7 Brass & Bronze Blower with 10 HP 3600 RPM motor.
1200 cfm Buffalo, 9½ x 7 x 7¼ with 7½ HP, 220/3/60 1750 motor.
800 cfm @1½# American Sirroco blower with 10 HP 3/60/3600 RPM motor.
675 cfm @ 6 oz. Spencer CC with 2 HP, 3 ph., 60 cy., 3600 RPM motor.
600 cfm @3# Spencer turb. blower with 10 HP, 1700 RPM motor.
225-400 cfm @1# Sturtevant CC with 3 HP 3/60/3600 RPM motor.
20¼ x 16¼ x 18¼ Allington and Curtis No. 55 (belt drive).
10½ x 10½ American size 5 (belt drive).
(2) 8 x 8 Sturtevant size 21061-9 (belt drive).

THE MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVENUE
CLEVELAND 14, OHIO

FOR SALE

One—5 ton electric melting furnace with transformer and controls.

One—Moore size W rapid Lectromelt furnace and transformer.

Two—8,000 lb. Modern Equipment Co. bottom pour ladles.

One—Beardsley-Piper 5' x 10' Selecto shake-out.

One—Electric driven continuous pour railway, rectangular in shape, 30 cars, 290 ft. length.

BOX 885

THE FOUNDRY **CLEVELAND 13, OHIO**

FOR SALE
ALMOST NEW

1—Johnson & Jennings No. 815 Jolt rollover pattern draw molding machine. Excess war equipment, good operating condition. Address: STROM BRASS FOUNDRY, ELKHART, INDIANA.

FOR SALE

1—Ransohoff Water Mill 36 x 60 side loading and end loading. Automatic star separation and star return. Complete with direct drive and in good condition.

1—405 Osborn Jolt Roll-over pattern draw; jolt cylinder 12" dia. Pattern draw 18" max. flask limit 64".

1—46" dia. x 56" inside length tumbling barrels.

2—30" dia. x 42" inside length tumbling barrels.

BOX 635

The FOUNDRY **CLEVELAND 13, OHIO**

FOR SALE

1—No. 1-24" Whiting Cupola Model A.

1—No. 1-24" Whiting Cupola Model B with vertical skim charger less motor and hoist.

P. O. BOX 269

HUNTINGTON PARK **CALIFORNIA**

FOR SALE

No. 918B "Johnston & Jennings" jolt rollover molding machine. Table size 44" x 54". Pattern draw 20", capacity 2,000 lbs. @ 80 lb. pressure.

GREDE FOUNDRIES, INC.
P. O. BOX 443
MILWAUKEE 1, WISCONSIN
TELEPHONE: MITCHELL 2450

FOR SALE

1—42" shell, reconditioned cupola, complete with 3200 CFM blower, 10 H.P. 3600 RPM electric motor, starter, etc. Price $1000.00 complete.

WARD BROS. FOUNDRY, INC.

HORSEHEADS, N. Y.

For Sale

EQUIPMENT FOR SALE

We have moved to our new shop which enables us to give immediate delivery on 10 and 11" Haynes squeezers. We will appreciate your business.

1—Curtis Air Compressor with tank.
1—Worthington Air Compressor.
1—Ingersoll Rand Air Compressor.
14—Steel Cabinets and Lockers.
1—Lot Conveyors complete with stands and Curves.
1—Electro Lift.
1—Water Tumbler.
1—No. 50 Large Exhaust Fan.
20—Skids.
1—Battery Lift Truck, table 40" long, 30" wide, 10" from floor, lift 3".
2—Jeffrey Sand Conditioners.
10—New #40 Crucibles.

We have 75 sets of each of the following Steel Flasks.

17 x 27
12 x 31
19 x 33
11 x 41
19 x 18
12 x 31
19 x 33
18 x 19
18 Round

1—Type K, 48 x 48 x 42 American Pressure Blast Cabinet complete with Bag Dust Arrester, Electric Wrapper Exhaust Fans and Motor, bought new in '42.

HAYNES FOUNDRY EQUIPMENT CO.
1734 LAKE ST. **KALAMAZOO 21, MICH.**

FOR SALE
1800' AIR COMPRESSORS

2—Sullivan type WN-31 air compressors, angle compound, 2 stage, direct connected to General Electric 300 H.P. synchronous motors, exciters, control panels, after-coolers, air receivers, etc.

NEW 1943 **IMMEDIATE DELIVERY**
OTHER SIZES OF
LATE TYPE MACHINES AVAILABLE

DENNY & CLARK
910 N. MARSHFIELD AVE, CHICAGO 22, ILL.

FOR SALE

Sly. Tumbling Mill. 60" x 36" x 36" Sq. Exhaust Type. Gear Drive. Inside Lined Hardened Steel. Good Condition.

Grisholt Turret Lathe. 3½" Cap. Quick Return. Good Condition.

J and L 3" x 36" Good Condition. Buffalo Pressure Blower. No. 10. 12" Outlet. Double Drive. Good Condition. For No. 8 Whiting Cupola.

Higley Cold Saw, 21" Saw Undercut. Good Condition. Complete.

Pangborn Shot Blast. Hand Type.

JAY SALTER
306 ROSEDALE ST.
ROCHESTER, N. Y.

FOR SALE

1—3000# Meco cylindrical mixing ladle on truck with 11" wheels D gearing with oil pump—excellent condition.
200—Sterling tight steel flasks style AA cope 12 x 20 x 8, style A drag, 12 x 20 x 5—excellent condition.
1—100 HP century ball bearing motor 1160 RPM, 440 Volt, 3 Phase, 60 Cycle, Frame 584, type SC—never used.

TEXAS FOUNDRIES, INC.
LUFKIN, TEXAS

Classified Advertising

For Sale

OVERHEAD CRANES

1-Ton
Whiting 33′ Span
Curtis 24′ Span
1½-Ton
Shepard Niles 25′6″ Span
P & H 34′ Span
2-Ton
Louden 19′2″ Span
Box 36′9″ Span
Detroit 28′ Span
3-Ton
Shaw 33′ Span
P & H 25′ Span
Northern 22′ Span
Manning, Maxwell & Moore 48′¾″
"Conco" 48′ and 26′6″ Spans
5-Ton
Whiting 47′4″ Span
38′10½″ Span D.C.
Northern 30′9″ Span
Milwaukee 70′ Span
Milwaukee 66′9″ Span
Manning, Maxwell & Moore 70′ Span
Manning, Maxwell & Moore 47′4″ Span
Shaw 36′ Span
Champion 37′6″ Span
American 70′ Span
American 47′4″ Span
6-Ton
P & H 77′ Span
American 77′ Span
7½-Ton
Shepard 36′ Span
10-Ton
Shaw 68′ Span
Shaw 73′ Span
P & H 30′ Span
P & H 87′6″ Span
P & H 80′ Span
Northern 71′10½″ Span
Northern 60′ Span
Morgan 55′6″ Span
Morgan 39′5″ Span
Morgan 52′3″ Span
Milwaukee 66′9″ Span
McGill 85′ Span
Lane 50′ Span
Emsco 75′ Span
Dominion 35′ Span
Cleveland 38′1½″ Span
Cleveland 50′ Span
Alliance 71′10½″ Span
Alliance 58′9″ Span
Albany 60′ Span
15-Ton
Whiting 71′10½″ Span
Northern 53′ Span
Erie 60′ Span
Chesapeake 55′6″ Span
Case 51′ Span
20-Ton
Shepard Niles 49′6″ Span
P & H 51′4″ Span
Northern 60′ Span
Morgan 60′ Span
Cleveland 65′ Span
25-Ton
Whiting 106′ Span
Tysaman 60′ Span
P & H 70′ Span
Morgan 52′3″ Span
Cleveland 106′ Span
Case 63′ Span
Bedford 50′ Span
30-Ton
Whiting 80′ Span
P & H 80′ Span
P & H 60′ Span
Morgan 30′ Span
Case 41′ Span
35-Ton
Bedford 50′ Span
Northern 22′ Span
50-Ton
Shaw 95′ Span
Shaw 69′10″ Span
Dominion 80′ Span
Cleveland 71′10½″ Span
75-Ton
Morgan 59′2½″ Span
Alliance 78′ Span
Alliance 37′ Span
80-Ton
American 40′6″ Span
125-Ton
Morgan 100′ Span
150-Ton
Whiting 30′ Span
175-Ton
Morgan 54′ Span
200-Ton
Alliance 100′ Span

Telephone us collect to discuss your requirements.

ECONOMY CO., INC.
49 VANDERBILT AVENUE, NEW YORK 17, N. Y.
Telephones: MUrrayhill 4-2294, 4-2893, 4-2295, 4-2844, 4-2296, 4-8292

FOR SALE
FOUNDRY MACHINERY

Wilbronham Green Blower, size 7A; Shepard Crane, 3 Ton, complete; 2-Whiting Cupolas, 90″.

ABBOTT SALVAGE CO.
1087 CLINTON ST.
BUFFALO 6, N. Y.

FOR SALE

1—1000 lb. Modern Cylindrical Insulated Ladle
1—Blystone Sand Mixer

BAY CITY FOUNDRY COMPANY
BAY CITY, MICHIGAN

FOR SALE

Flask bands in good used condition. Available in small lots and various sizes from 10 x 14 to 16 x 16. Write for list and prices—Attention Mr. K. W. Comstock.

GALE MANUFACTURING CO.
Albion, Michigan.

REBUILT EQUIPMENT

Molding machines, all types; tumbling mills; furnaces; cupolas; air compressors; hoists; rammers, all types; ladles, all types; sand mixers; sand blast tanks; core machines, etc. All equipment rebuilt and guaranteed.

HAYNES FOUNDRY EQUIPMENT COMPANY
814 ADA ST. KALAMAZOO 21, MICH.

FOR SALE

New Hines	Pop-Off	Flasks
15 x 40 —	9″ Cope	6″ Drag
14 x 30 —	6″ Cope	6″ Drag
24 x 26 —	8″ Cope	8″ Drag
15 x 32 —	8″ Cope	6″ Drag
15 x 44 —	9″ Cope	6″ Drag
23 x 25 —	6″ Cope	12″ Drag

THE BARDES FORGE & FOUNDRY CO.
2619 COLERAIN AVENUE
CINCINNATI 14, OHIO

FOR SALE

Immediate delivery one 1000 KVA forty degree rise 3 phase 60 cycles electric furnace transformer for 7200 volt power supply.

BOX 800
The FOUNDRY CLEVELAND 13, OHIO

FOR SALE

Electric traveling crane, 15 H. P. span. Center to center or runway rail 42′ 8″. This is a used crane located in New Castle, Pa. Price is reasonable. Address: Box 896, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Rothers overhead travel crane, 4 ton, 3 motors, 30 ft. span with 160 ft. runway and structure.

ABBOTT SALVAGE CO.
1087 CLINTON ST., BUFFALO 6, N. Y.

FOR SALE

1 Hausfeld tilting crucible furnace 150 to 175 crucible. Used less than ten heats. Address: Box 873, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Jeffrey sanditioner, semi-portable #3. Purchased new in September, 1942. Now operating daily. Good condition. Address: Box 895, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Pangborn blast cleaning hose machine type "AU-11". Tank capacity (1000 lbs.) (approx.) Complete—hose and nozzles nearly new. Address: Box 903. The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Heavy duty motorized rod cutter, 65 cuts per minute; capacity: ⅜ inch round hot rolled steel. Brand new. $890.00 f.o.b. Cleveland. Address: Box 772, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

No. 2 Roots positive blower. Address: B. C. Bartley Co., Bartley, N. J.

For Sale

REBUILT EQUIPMENT IN STOCK

Molding Machines
2—International Type F 24″ x 10″ Stationary Power Jolt, Rollover, and 10″ draw.
1—Plain Jolt 36″ x 48″ Table 12″ dia. cyl.
1—Plain Jolt 42″ x 60″ Table 17″ dia. cyl.
1—Plain Jolt 48″ x 72″ Table 14″ dia. cyl.
2—Arcade Modern No. 2-38 Portable or Stationary Hand operated Squeeze Rollover Draw with swing out table.
5—Mumford 3″ cyl. Core Jolt with 20″ x 15″ table.

Metal Melting Equipment
New 32″ to 41″ dia. shell cupolas made to order.
1—Monarch Tilting Iron Pot Aluminum Furnace 100 lbs. cap. Gas or Oil.
2—Hausfeld Tilting Crucible Aluminum Furnaces 33″ dia. shell. Gas or Oil.
2—Hausfeld Open Flame Tilting Brass Furnaces 400 lbs. cap. Gas or Oil.
2—Monarch-Rockwell Rotating 500 lbs. brass. Oil.
Blowers for Cupolas and Furnaces
Maxon-Premix Blower Sets for Gas ⅛ to 1 H.P.
Motor Driven Centrifugal blowers to 2 lbs. press.
Belt Driven Centrifugal blowers for Cupolas.

Tumbling Mills and Sand Blast
1—Barrel Type Magnetic Separator—AC driven with DC generator.
3—Portable Sand Blast generator tanks 500 lbs. sand capacity.
2—4000 lbs. cap. Tilting Crane Ladles, V-bail, worm geared.
1—Approx. 8 cu. ft. cap. tilting trough type sand mixer.
Air Compressors 1 to 60 H.P.

CLIFTON MACHINERY CO.
1023 W. 6th ST. CINCINNATI 3, OHIO
PHONE PARKWAY 7812

FOR SALE

Pangborn rotoblast barrel type GJ-1—16 cubic foot capacity. Complete with loader, dust collector, blower and spare parts. In A-1 condition. Immediate delivery.

FARRELL-CHEEK STEEL COMPANY
SANDUSKY, OHIO

FOR SALE

Sly Tumbling Mill 36″ x 72″ x 1″
*Sly S. B. Cabinet Type A 36″ x 60″ with No. 11 Dust Hopper, motor exhaust.

*Purchased new 1944.

N. P. NELSON IRON WORKS, INC.
820 BLOOMFIELD AVE.
CLIFTON, N. J.

FOR SALE

1—No. 4 Sly Sand Blast complete, like new, in use less than one year. Immediate delivery.
THE REPUBLIC BRASS COMPANY

1623 E. 45TH ST.
CLEVELAND 3, OHIO

FOR SALE

Steel grit. Several tons each 36 grit and 36-60 grit. Samples and prices on request.

BAY STATE ABRASIVE PRODUCTS CO.
WESTBORO, MASS.

Books You'll Want

If you want to broaden your knowledge of the foundry industry the following informative and instructive books will prove most helpful. Select the ones you need at once—use the convenient order form below.

Gates and Risers for Castings
Price $4.00
By Pat Dwyer. Sound foundry practice. How to prevent casting defects.

Modern Core Practices and Theories *Price,* $5.00
By Harry W. Dietert. A book devoted completely and in great detail to the production of cores. Will prove beneficial to every foundryman.

A.F.A. Symposium on Malleable Iron Melting *Price,* $3.00
Comprehensive, authoritative compilation. Just recently off the press.

Modern Blast Cleaning and Ventilation *Price,* $4.00
By C. A. Reams. Casting cleaning methods presented and discussed in detail. Also abrasive selection and use.

Tales from the Gangway *Price,* $1.00
A rollicking series of articles that contain practical solutions to everyday foundry problems. Written as only Pat Dwyer could do it.

Alloy Cast Irons *Price,* $3.25
Second edition. Thoroughly covers the subject in theory and actual foundry practices.

Just Published

HANDBOOK ON CUPOLA OPERATION

This 470-page text is the most complete ever assembled in one volume on the subject of cupola construction.

Every foundry operating a cupola will find this volume highly valuable.

Price $5.50

American Malleable Iron
Price, $4.00
Complete data on present manufacturing practice and specifications of malleable cast iron.

Recommended Practices for the Sand Casting of Nonferrous Alloys
Price, $3.00
A new book, just off the presses that will prove invaluable to nonferrous foundrymen.

Cast Metals Handbook
Price, $6.00
A complete authoritative reference book dealing with all cast metals . . . steel, malleable, nonferrous and gray iron.

Impact Cleaning *Price,* $7.00
By Wm. A. Rosenberger. A compendium of impact cleaning information. Recommended methods.

Magnesium Alloys Foundry Practice
Price, $3.00
A new book covering all phases and latest developments of magnesium casting.

Foundry Sand Testing Handbook
Price, $3.50
The accepted standard reference book on methods of testing and grading foundry sands and clays.

A.F.A. SAFETY AND HYGIENE CODES

Code of Recommended Practices for Testing and Measuring Air Flow in Exhaust Systems . . . . Price, $1.00

Code of Recommended Practices for Grinding, Polishing and Buffing Equipment Sanitation . . Price, $ .60

Code of Recommended Good Safety Practices for the Protection of Foundry Workers . . . . . Price, $2.50

Code of Recommended Practices for Industrial Housekeeping and Sanitation . . . . . Price, $1.50

Recommended Good Practice Code and Handbook on Fundamentals of Design, Construction, Operation and Maintenance of Exhaust Systems . . . . . Price, $4.00

ORDER YOUR COPIES TODAY

THE FOUNDRY—Book Department—1213 West Third St., Cleveland 13, Ohio
Please send (postpaid) the following books I have checked.

Enclosed is $ . . . . . *. ☐ Money Order; ☐ Check; ☐ Company Order

- ☐ Handbook on Cupola Operation, $5.50.
- ☐ Gates and Risers for Castings, $4.00.
- ☐ Modern Core Practices and Theories, $5.00.
- ☐ A. F. A. Symposium on Malleable Iron Melting, $3.00.
- ☐ Modern Blast Cleaning and Ventilation, $4.00.
- ☐ Tales from the Gangway, $1.00.
- ☐ Alloy Cast Irons, $3.25.
- ☐ American Malleable Iron, $4.00.
- ☐ Recommended Practices for the Sand Casting of Nonferrous Alloys, $3.00.
- ☐ Cast Metals Handbook, $6.00.
- ☐ Impact Cleaning, $7.00.
- ☐ Magnesium Alloys Foundry Practice, $3.00.
- ☐ Foundry Sand Testing Handbook, $3.50.

A.F.A. SAFETY AND HYGIENE CODES:

- ☐ Testing and Measuring Air Flow in Exhaust System, $1.00.
- ☐ Grinding, Polishing and Buffing Equipment Sanitation, 60 cents.
- ☐ Design, Construction, Operation and Maintenance of Exhaust Systems, $4.00.
- ☐ Protection of Foundry Workers, $2.50.
- ☐ Industrial Housekeeping and Sanitation, $1.50.

NAME . . . . . .

ADDRESS . . . . . .

CITY . . . . . **STATE** . . . . . .

* Orders for delivery in Ohio must be accompanied by 3% additional to cover the compulsory state sales tax.

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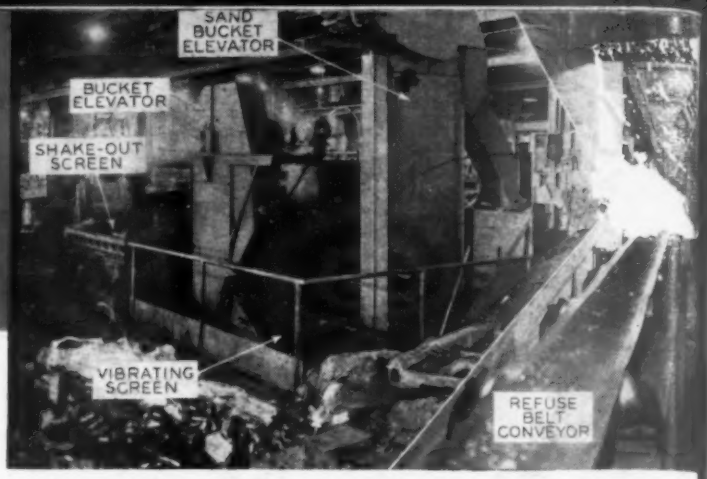
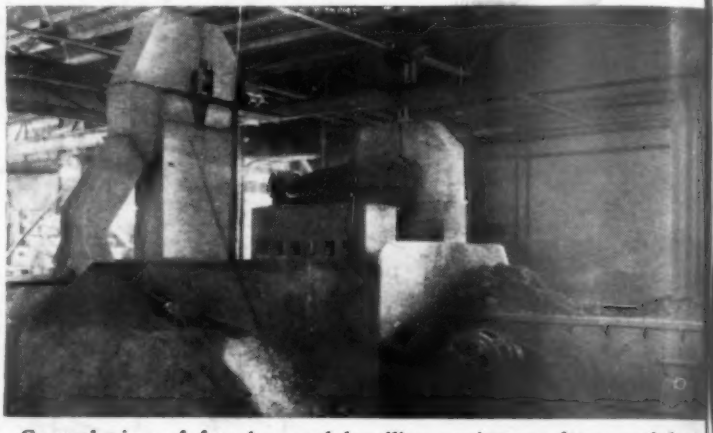


Left part of photo above shows foundry sand handling equipment abo floor. Part of photo at right shows Link-Belt roller-bearing belt conve in tunnel, for carrying away the refuse.



General view of foundry sand handling equipment from push-butt control panel side, showing also one side of screened sand pile, wi two-way chute from head of bucket elevator. Shakeout unit is seen right of safety enclosure around pit.

THE Brewster Co., Inc., Shreveport, La., operates a steel foundry with a one-ton electric steel furnace, with capacity to pour 14 tons of castings per 8-hr. day.

About two years ago, they installed a compact Link-Belt mechanical sand handling unit with a central shakeout for the molds.

Now 10 men, instead of 18 ladle and shakeout men, do all the work. They pour the "heats," and between heats they shake out the molds of previous heats with the aid of an overhead crane and the central shakeout, forming part of the new equipment. With the shortage of manpower, it was easy to find other work for the eight men released.

This equipment consists of the following:

1 A shakeout screen, measuring 8′ x 5′, which allows the sand to fall through to a collecting hopper.

2 A belt feeder which handles the sand uniformly from collecting hopper to bucket elevator.

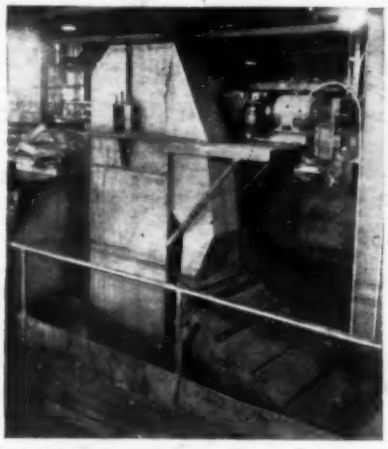
3 A centrifugal-discharge bucket elevator for lifting the sand to classifying screen.

4 A triple-deck vibrating screen for classifying and reconditioning the usable sand and getting rid of the reject material. The waste material consists of gaggers, pieces of metal and lumps of sand falling over end of top deck, and the "fines" that fall through meshes of bottom deck. The material passing over end of bottom deck is used for making facing sand. Sand from end of intermediate deck, also the bottom deck, is conditioned for use as backing sand. The sand collecting chutes from end of intermediate and bottom screening decks are equipped with discharge gates, and long levers hand-operated from foundry floor, to permit discharging this material either to clean-sand bucket elevator or to refuse disposal belt conveyor.

5 A centrifugal-discharge bucket elevator deposits the sand on the foundry floor alongside of sand mixer. Elevator has a two-way discharge spout with flop gate. One pile contains sand to be conditioned for backup sand, the other the sand to be used in making facing sand.

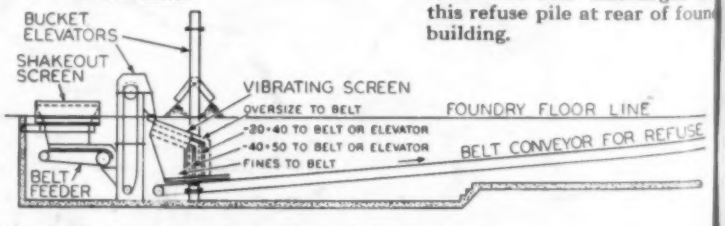
6 A belt conveyor in tunnel below foundry floor, for carrying away the refuse from classifying screen to a pile at rear of foundry building.

Mechanization of your foundry operation is a vital form of preparation for the competitive years that lie ahead. Link-Belt Engineers will be pleased to consult with you.



Link-Belt bucket elevator and top of fully-housed vibrating screen which separates the refuse from the usable sand.

Discharge end of tunnel b conveyor which carries away reject material from foun sand unit and discharges it this refuse pile at rear of foun building.



Simplified side-elevation sketch of Link-Belt centralized foundry sand shakeout and handling unit in electric steel foundry.

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